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THE ESSENTIALS OF GOOD TEACHING

BY

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WITH INTRODUCTION BY

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PREFACE

MANY years of experience in supervising practice teaching and in conducting method courses preparatory to such teaching have developed in the writer the conviction that intelligent self-direction is the most economical and respectable means of producing improvement in the art of teaching, provided the "self-direction" is guided by a knowledge of the basic principles of good teaching. Thus safeguarded, self-direction is *economical* in that it insures a thoughtful beginning and thereby avoids much of the wasteful expenditure of energy involved in reconstructing harmful habits that have resulted from imitation. It is *respectable* in that it has a universally accepted foundation and is, therefore, capable of being defended.

The form of the present volume is the result of a desire, and even a hope, of the writer to lay bare the *essentials of good teaching* in a simple, concrete, and consistent manner in order to conserve the time and energy of teachers who are anxious for intelligent guidance in their teaching. The order and the organization of the various chapters are determined by the principles that are emphasized in the first chapter. An occasional reference to these principles will aid one in determining the sequence and relative worth of the topics presented.

The writer desires to acknowledge the valuable suggestions he has received from the critic teachers of the practice department of the Illinois State Normal University during the years he has been director of practice teaching. He desires especially to express appreciation for the helpful suggestions of Professor M. J. Holmes and of Principal T. J. Lancaster, of the Illinois

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State Normal University, who read the entire manuscript, and for the sympathetic assistance of his wife, Charlotte Griggs Turner.

Normal, Ill.
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EDITOR'S INTRODUCTION

Most books on classroom technique are filled with helps, outlines, devices, and tricks of the trade. They are concerned with the practice of education. Such books usually find a ready market because teachers want to know *how* to teach. Moreover, skillful manipulation is frequently accepted as an index of good teaching. But to fix attention upon helps and devices is to fix attention upon the externals of education. It means that thought is arrested on the plane of thinking in things rather than on the plane of thinking in principles; it means that the practical judgment — the judgment which deals with the near-at-hand in a manner analogous to some similar experience — is emphasized at the expense of the conceptual judgment — the judgment which determines conduct in terms of principles or tested experience. It is obvious that these levels of thought find expression in levels of technique. The exercise of the practical judgment results in devices; the exercise of the conceptual judgment results in principles.

Few writers on education have reduced practice to principle, and yet it is only as one is cognizant of principles that he is able to illumine practice. Not a few still cherish the tradition that theory is something separate and quite apart from practice. They fail to recognize that, in general, theory is the result of the failures of practice. One discovers fundamentals by observing their manifestations. Just so long as things run smoothly, so long as there is no break in the current of things, there is no occasion for thought. One thinks when his mental equilibrium is disturbed, when he is conscious of some maladjustment, when the sensation of strain between what one is and is not but

ought to be is intensified. Only then does he have a problem; only then does he search for the hidden factors which explain the breaks in thought or the breaches of conduct. These considerations hold with equal force when applied to school procedure. To arrive at the essentials of classroom teaching one must observe teaching itself. He will note its failure to secure satisfactory results. He will interpret its strengths and weaknesses in terms of life outside the school. He will check the completeness with which the child is being adjusted to the world outside by being adjusted to a constantly enlarging series of worlds inside the school. Every stage and every step of the process will be tested to discover the principles that underlie and explain the best practice.

Such is the manner in which the philosophy of this book has been built up. The author for years has been the director of a training school. His program of education and outline of principles are the result of thousands of recitations that he had observed. At the very outset he differentiates teaching from other forms of activity. He defines aims of public school teaching in terms of social needs; describes the origin, growth, and organization of subject-matter and shows its functional implications; explains clearly how the child is the chief determinant of method; applies the principles thus arrived at to ways of learning, acquisition of habits, the development of appreciation, means of imposing responsibility; outlines the character of stimuli involved in good teaching, and finally shows how these essentials of good teaching should actually be employed in the presentation of the various elementary school subjects.

For the teacher who desires a safe and sane philosophy, a wholesome philosophy, one that has stood the test of experience, this book will prove invaluable. For one who needs a solid base upon which to build a substantial superstructure of schoolroom experience, this book will serve as a safe guide. For one who is disturbed by the thousand and one miscellaneous and

apparently inchoate performances of the schoolroom, this book will aid in unifying and in interpreting them. In addition the manuscript has the merit of being simple in style and of possessing that concreteness of illustration and wealth of detail that adapt it to the use of young as well as to old teachers.

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THE ESSENTIALS OF GOOD TEACHING

CHAPTER I

TEACHING DISTINGUISHED FROM OTHER FORMS OF DOING

Earmarks of Industrial Success. — In ordinary affairs we are accustomed to think of forethought and systematic planning as prerequisites to success. A successful gardener considers climatic probabilities, soil fertility, quality of seed, period of maturity, methods of planting, cultivating, and harvesting before he begins to plant. The successful merchant holds in imagination the probable needs of his customers for the coming season before he lays in the season's goods. The successful contractor critically examines the blueprint of a proposed structure, a price list of the materials required, and the availability and cost of the labor needed to construct it before he bids on the building in question. In short, *seeing the end from the beginning* is an earmark of reliable and consistent success in the industries.

Earmarks of Good Teaching. — This earmark of success characterizes good teaching also. Adequate forethought is more fruitful in teaching than in the less subtle and more concrete processes. There can be no doubt, however, that

"seeing the end from the beginning" is a much more complicated process in teaching than in most fields of endeavor. Those who think otherwise have in mind but a portion of the teaching process. They think of subject-matter and scholarship as the prime prerequisites of teaching success. The number of such persons in the teaching profession is sufficient to justify detailed consideration of the essential factors in the teaching process at the outset of a discussion of methods of teaching.

There is no science of teaching — not even a teaching art — for those who hold this view. It is vital therefore that teaching be distinguished from other forms of doing and that its essential characteristics be written large so that beginners may realize the complexity, the coördination, the understanding, and the skills involved in efficient teaching.

Scholarship Not a Guarantee of Good Teaching. — A certain degree of scholarship is a necessary but not a sufficient preparation for teaching. The scores of normal schools, city training schools, teachers' colleges, and the general supervision of teaching throughout the country are concrete evidence of the accuracy of this statement. There is a widely accepted notion among patrons and even among the rank and file of teachers that if one has sufficient academic training he is qualified to teach successfully. This view is so significant and its acceptance so hazardous that it should not be ignored by teachers of pedagogy. It is incumbent upon those who profess to believe in the science of teaching either to expose the fallacious theory that scholarship is a sufficient prerequisite to teach adequately; or to abandon, temporarily at least, the claims for the adequacy of methods of teaching.

Factors in a Successful Act

Like the solution of every complex problem, that of good teaching must be approached through an analysis of the problem into its essential factors. One must discover the steps in the conscious process of performing an act and observe in what particulars they differ from the steps in the conscious process of teaching some one to perform a similar act.

A Definite Aim. — It is inconceivable that one should deliberately perform an act without a *purpose* or *aim*. Observation of individual endeavor discovers purpose. The acts of the farmer as he goes back and forth across the field at his plowing; the acts of the shoemaker in applying his trade from day to day; the multitudinous acts of the housekeeper in her daily round of activity; and the various moves of the fisherman in his endeavor to excite the appetite of the finny tribe; would seem incoherent and ridiculous to the observer did he not discover purpose back of them all.

One must admit, however, that all human activity is not deliberately performed. Through the processes of physical evolution many fundamental activities have been provided for by automatic reactions. Reflexes and instincts are ready-made methods of performing many vital acts which are fundamental to the welfare of the individual and to the race. One cannot afford to close the eye deliberately when a flying cinder approaches it. Neither can he afford to take chances of escaping the fangs of a rattle-snake by thinking about a way to escape. In either case deliberation is too slow a process. Nature has provided ready-made ways of successfully doing many things which demand

immediate action for the care and welfare of the body. Unconscious imitation is a familiar example of the prevalence and importance of unpremeditated activities.

Habit also plays a large and important part in human welfare. One large function of systematic training is the reduction of consciously directed activities to habits. Effective habits conserve both time and energy, make for efficiency, reduce fatigue, and release mental and physical energy for further accomplishments.

Though native and habituated reactions are many and varied, and of vital significance in individual and racial economy, they are not peculiarly human qualities. It is only when one deliberately begins to control his evironment and consciously directs his energy to the accomplishment of some purpose that his act savors of human quality. It is to be assumed, therefore, that in every deliberate performance man has an aim. To the extent that the aim is definite and concrete there is an assurance of success.

A Knowledge of Materials. — Though a definite concrete aim is essential to successful endeavor, it is by no means a complete guarantee of success. A fisherman may have a very definite notion of how he expects to ensnare a fish in the brook and yet completely fail in his efforts. He must have a definite knowledge of the *materials* to be employed in the realization of his aim. If the fisherman is to succeed, he must know the sort of bait to use and how to prepare it. He must have a knowledge of the fishing tackle employed by successful fishermen, — poles, lines, sinkers, bobbers, reels, and hooks. He must have a general notion of the mouth structure of the various species of fish he is trying to catch, as well as a general knowledge of the feeding habits of these species.

In like manner, successful farming depends upon a definite knowledge of the materials employed. To be efficient, the farmer must understand the chemical ingredients of the crops he raises and the relative prevalence of these ingredients in the soils he cultivates. He must know when and how to sow and reap most advantageously. He must be familiar with improved farm implements and with their relative value in preparing the soil.

Whether it be fishing, farming, house building, running a grocery, the making of brooms, the constructing of automobiles, or the baking of bread, adequate and continuous success depends upon a thorough knowledge of the materials employed by him who is conducting the enterprise.

Skill in Controlling Materials. — One may have a definite aim and a perfect understanding of the materials to be employed and yet fail in an endeavor. A sportsman may have a very clear notion of the game he expects to bag and a very thorough knowledge of guns and ammunitions, and yet disgrace himself in a hunting contest. Indeed he may understand the specific purpose of each make of gun, be familiar with the propelling power of each grain of explosive used, and know the degrees of hardness of the bullets employed. Moreover, it is possible that he may be conscious of the fundamental principle which is involved in all successful shooting, namely, "two points determine a straight line," and yet fail as a sportsman. Successful hunting consists in more than a definite aim and a thorough knowledge of the materials employed in the realization of that aim. It is conditioned by the degree of skill employed in manipulating the firing piece.

What is essential to success in hunting is essential to a greater or less extent in other successful enterprises. As

human endeavor becomes more highly specialized and as competition increases, *skill* becomes an increasingly large factor in success.

Boundless Enthusiasm. — One would suppose that if he possesses a definite aim, a thorough knowledge of the materials to be employed, and skill in manipulating the materials in the furtherance of the aim, a successful accomplishment is assured. On the contrary, however, experience is rich with incidents that belie the apparent trustworthiness of this supposition. Who has not known a tramp or a vagabond who possessed "skill," a "thorough knowledge of materials" and who at intervals apparently had a "definite aim"? Not infrequently the persistent lounger on grocery boxes, in railway stations, around public buildings, and about public squares possesses one or all of these factors of success.

Purpose, knowledge, and skill, though essential, are not in themselves a sufficient guarantee of success. They must be reënforced with a *boundless enthusiasm*, to insure a high degree of success. Emotion is the mainspring to action. It insures persistency of effort. It alone keeps one "on the job" against great distractions. Enthusiasm need not be of a violent form. It may be and usually should be quiet and submerged. Indeed, the best sort is of the quiet and intense kind. It must, however, *possess* the endeavorer. It must keep one at his task until he manipulates the materials he understands, in such a way as to realize his purpose.

It is apparent from the above analysis that successful conscious endeavor involves a *definite aim*, a *knowledge of the essential materials* needed in the realization of the aim, *skill* in adjusting the materials to the requirements of the

aim, and lastly an *unabating enthusiasm*. One possessed of these qualities can scarcely fail in any normal enterprise which engages his attention.

Factors Peculiar to a Successful Teaching Act

If one constructs a box or a series of boxes successfully, each of the factors referred to above is involved. Should he teach another to construct the box, what steps should he take? It is apparent that there is a decided difference in the two processes. The problem before us is: *In what essential particulars does doing a thing differ from teaching some one to do that thing?* How do the factors involved in constructing a box differ from those involved in teaching some one to construct it?

One may be very successful in making boxes and yet have little or no capacity for teaching others to make them. Children may observe a box-maker make a box and through the process of conscious imitation learn to make an equally good box. The box-maker, however, does not teach the children to make the box any more than the squirrel, the cow, and the sheep teach those who imitate their voices. In all such cases the children learn, but they are not taught. Teaching consists in something more subtle than the expression of ideas and the solution of problems subject to imitation. It involves a round of inter-related activities quite as marked and more difficult of comprehension than those concerned with an ordinary overt act.

Social Aim. — The first of these activities, when teaching is properly directed, is a *social aim*. The school is an instrument of society, created and maintained by it, first of all, for its own betterment. Buildings, appliances, books,

and teachers are all utilized in the accomplishment of this end. When once this view is obtained it serves as a standard in deciding the suitability of the subject-matter. Without it the teacher is helpless in the choice of curricula. His only recourse is imitation. A teacher must have a very definite notion of what society wants the school to accomplish in order to avoid traditional imitation in the choice of subject-matter. The social aim is to the teacher what the barometer is to the weather expert and the polar star is to the navigator. A further analysis reveals other significant factors in the teaching process.

Function and Structure of Subject-Matter. — It is not enough that the teacher know what society desires the child to become. He must be familiar also with the function and structure of the subject-matter employed. Scholarship is a prerequisite to successful teaching. There is no substitute for scholarship. The teacher must know what he should teach and understand the method of exposing it, if he would insure its transfer to others. The importance of this factor in the teaching process is evidenced by the fact that teachers in all ages have stressed its relative value. Young teachers have been more concerned with the nature of subject-matter than with the nature of the child activity involved in its attainment, and probably always will be. It is quite certain that an understanding of the importance of the other factors involved in teaching should in no wise lessen our respect for a sane understanding of the subject-matter. Scholarship will always be a vital and essential factor of good teaching.

Knowledge of the Reactive Attitude of the Child. — A chicken while being chased indiscriminately by a small child ran through a gate into the inclosure where its com-

panions were. Its going into the inclosure was in no way determined by the forethought of the child or conditioned by any systematic effort on his part. It chanced to run into the inclosure. On another occasion it may run in the opposite direction. In either case the child should not receive credit for determining the particular outcome of the chase.

Suppose on the other hand an adult who has long cared for chickens undertakes to get a strayed chicken into its pen. He will probably get some corn and scatter it near the chicken. After a little he will scatter it nearer and nearer the gate until the victim of his strategy strolls through the opening into the inclosure.

The results of these two acts are the same. The processes are decidedly different. The first result was one of chance. There was no forethought, no reflection on the reactive attitude of the chicken, no anything, except undirected and impulsive energy. The result was one of chance, not one of conscious effort. The second act was conditioned by experience. The performer had observed how chickens react when food is thrown before them. He had observed how they react when chased or when thrown at. A comparison of the results had led him to the conclusion that chickens can be successfully "tolled" through gates and into pens by means of properly directed grains of corn. There was no chance in this act. There was a certainty, at least as much of a certainty as accompanies the ordinary plans of life. A knowledge of chicken behavior which results when various stimuli are applied was essential to the specific results acquired.

In like manner child behavior may be controlled in these two ways at least. By chance one may create stimuli

which cause a child to do the desired thing, or to acquire the desired knowledge. In this case the child learns, but the producer of the chance stimuli does not teach. The teaching act consists of something more specific. It involves an *understanding of the reactive attitude of the child.*

A knowledge of the child's reactive attitude, like that of the chicken, is gained directly or indirectly through experience. One may attain it through introspecting his own response to stimuli when in the learning period. He may attain it through a comparison of the results secured and the stimuli employed in his endeavor to teach others. Through experimentation he may have measured carefully the relative value of stimuli in developing abilities. Indeed he may have acquired much insight into the secrets of child behavior through a systematic study of general and genetic psychology. It matters little how this knowledge is secured, but it is important that it be possessed by the teacher.

Knowledge of Appropriate Stimuli. — A knowledge of an adequate social aim, a knowledge of subject-matter, and of how children react to their environment, though essential to good teaching, are not sufficient. A knowledge of appropriate stimuli is a fundamental factor also. Through the process of growth, the school has evolved economical ways and means of securing the desired reactions of children. These accumulated and perfected ways and means — devices, or forms of stimuli — constitute the technique of classroom procedure. Skilled technique in the classroom is quite as important as it is in the hospital or in the laboratory. Forms of presenting subject-matter such as the lecture method, textbook method, developing

method, or combinations of these methods; various types of questions; forms of expression or statements employed in mathematics, or in language; illustrations, dramatization, synthetic and analytic approaches to phonograms, and all the like — illustrate what is meant by a knowledge of the appropriate stimuli required to insure efficient teaching.

Skillful Control of Stimuli. — Skill in directing appropriate stimuli is also essential to good teaching. It is not sufficient to know that questions to be effective must be concrete, definite, simple, attractive, and problematic. Good teaching involves power to use such questions. It is not sufficient to know that self-activity is essential to the acquisition of power. A teacher should be skilled in the use of the devices which stimulate self-activity. It is not sufficient to know that comparison is a most effective device for stimulating interest and forcing generalizations. Teaching involves skill in forcing comparisons which provoke thought. It is not enough to know that *illustrations* are much more effective than *explanations*. The successful teacher is skilled in the use of illustrations.

It is in this phase of the teaching act that experience counts for most. Skill involves the formation of habits through consistent and persistent effort. Long and consistent experience is needed to insure dependable and worthy skill in the use of teaching devices.

Enthusiasm for Teaching. — One may control all of the above factors and yet be a relatively poor teacher. The last factor in the process of analysis, but certainly not the last in order of importance, is that of *enthusiasm for the process of teaching*. As a dynamic phase of conduct this factor is as important in times of peace as in times of war.

It is as fundamental to success in teaching as to success in fighting.

Many a scholarly teacher has been unable to provoke thought or arouse interest because of a lack of visible enthusiasm. It has been said that enthusiasm is contagious. Certainly its possession by the teacher arouses a wholesome, hearty coöperation on the part of children. Fortunate is the teacher who has an abundant enthusiasm in his work. It cannot take the place of scholarship, skill, and the other factors, for they are essential. It can and will supplement and energize them and make them function.

We hear much of personality and of the appeal of subject-matter in connection with the teacher. No well-informed person will attempt to belittle their importance in the teaching act. They are exceedingly vital. However, they can be reached only through the procedure outlined above. One can scarcely conceive of a teacher possessing a poor personality, so far as it pertains to teaching, or of his failing to cause the subject-matter to appeal to children, if he possesses a mastery of these teaching factors in a superlative degree. Such a possession insures success and it will go far to determine a desirable *classroom* personality.

Summary. — Let us summarize the factors involved in solving an ordinary problem and those involved in successfully teaching one to solve such a problem. In the successful solution of an ordinary problem the performer has a definite aim, a knowledge of the materials, skill in adjusting the materials to the end in view, and enough enthusiasm to keep him on the job until the aim is realized.

In order to teach successfully the teacher will need to control the factors involved in doing and in addition to these

factors he will need to know the social aim of education, the structure and function of subject-matter, the reactive attitude of children, and the stimuli best suited to occasion the desired reactions; to possess skill in the employment of these stimuli, and to have an unabating enthusiasm for the process of transforming children through these agencies from what they are to what they ought to become.

CHAPTER II

THE AIMS OF PUBLIC-SCHOOL TEACHING

The Goal of Instruction. — In an era of unparalleled economic progress in which scientific principles are applied with precision and results are measured in absolute units, it is only natural that one should hear much of educative aims and educative values. The application of business methods to the work of the schoolroom has forced the educationist out into the open. In order to meet the practical demands made upon him he is obliged to define clearly the goal of instruction and its relation to social needs, and to point out clearly the educative processes by which it is attained most economically.

In view of the fact that the exponents of educational theory have had different basic experiences and different training, it is not strange that there is a lack of complete agreement as to the function of public education. And while a complete agreement is somewhat remote, it is essential to progress that a working hypothesis based upon the best that is accepted in education be established for the purpose of rationalizing teaching. It is now widely recognized that the school was and is established by society to subserve its ends; that these ends are relative and not absolute in quality, depending entirely upon the social conditions and upon the insight of the members who constitute the school units.

Dynamic Aspect of the Teacher's Aims. — It must be apparent at the outset that the *ends* or *aims* of instruction on the content side are dynamic in character, since society is constantly undergoing change. From the simple life of the tent-dweller and herder with its few yet significant responsibilities to the highly specialized life of the urbanite with definite social, economic, and political responsibilities, society has steadily grown more complex. With this increased complexity have come new demands and new standards of measurement, resulting in higher degrees of efficiency. Efficiency in one decade usually proves to be inefficiency in another. The musket was an efficient instrument of war in competition with the bow and arrow. It is decidedly inefficient in rivalry with the modern machine gun. To meet adequately the changing needs of society the standards of the school must be flexible and responsive to such needs.

Static Aspect of the Teacher's Aims. — The aims of instruction are also static in character. Viewed from the form side, they are the same yesterday, to-day, and forever. Just as the the word "man" will always represent the human animal in spite of the fact that he is constantly evolving, so "efficiency," "achievement," "adjustment," and "complete living," if satisfactory forms of expression now, should always be satisfactory.

An Apparent Diversity in the Aims of Instruction. — Educational philosophers have been groping about for an all-inclusive notion of the aim of education. Considering personal prejudices, differences in experience and ability, due to differences in social and natural inheritance, it is encouraging to note the strong resemblances in the educational conceptions which have been held by relatively re-

cent writers. More than fifty years ago, Herbert Spencer pointed out that it is the function of education to prepare one for "complete living."[1] Four decades later Professor Hanus similarly expressed the belief that "complete living"[2] is the aim of education. Continuing, he said, "To live completely means to be as useful as possible and to be happy. . . . By usefulness is meant service, that is, any activity which promotes the material or the spiritual interests of mankind, one or both. To be happy one must enjoy both his work and his leisure." Thorndike similarly held the aim of education to be "Good will to man, useful and happy lives, and noble enjoyment."[3]

O'Shea and Ruediger maintained that "adjustment" is the ultimate aim of education. The former said: "The real function of the school is to adjust the individual to his environment — physical, industrial, and social."[4] The latter expressed himself thus: "The aim of education may be defined as the adjustment of the individual to the life in which he must participate, this life being considered both in its objective and subjective aspects."[5] Viewing the same problem from a slightly different angle Bagley held that "Social efficiency . . . is the standard by which the forces of education must select the experiences that are to be impressed upon the individual."[6]

Charters maintained that "Appreciation and control of the values of life" are the goal of educational effort.[7]

[1] *Education*, Spencer. Page 31.
[2] *Educational Aims and Educational Values*, Hanus. Chap. I.
[3] *Principles of Teaching*, Thorndike. Chap. I.
[4] *Education as Adjustment*, O'Shea. Chaps. V and VI.
[5] *Principles of Education*, Ruediger. Chap. III.
[6] *The Ethical End of Education* and *The Educative Process*, Bagley.
[7] *Methods of Teaching*, Charters. Chap. I.

Snedden with a later word upon the subject declared that the school should create ability to "produce and utilize production."[1]

Social Efficiency a Working Aim. — A comparison of these statements of the aim of education forces the conclusion that there is a closer agreement than a casual examination indicates. These statements differ mainly in emphasis and in form of expression. All of these authors are keenly conscious of the social aspects of the school. The aim of each has a specific social reference. The distinctive social bearing of each of these aims indicates the universality of social efficiency as an aim of teaching.

Social efficiency in the *bulk* is a mere vagary and as such is of little value to him who needs a definite, concrete standard with which to evaluate the results of teaching. Only when it has a *definite reference* for teachers in service is it effective as a factor in method. It is essential, therefore, that social efficiency be understood in all its ramifications and that it have "synthetic connections with all the individuals to which it refers," if it is to be a positive help to teachers in service.

Social Needs

One is economically efficient when his appreciation and control are in harmony with his economic needs. One is likewise socially efficient when his appreciation and control are in harmony with the needs of the social unit of which he is a member. It is evident, therefore, that the school must be clearly aware of the fundamental needs of the social unit which maintains it before it can proceed effectively to educate the children of such a social unit.

[1] *Educational Readjustment*, Snedden.

For a satisfactory solution of a problem in any field of endeavor one must go back to original sources for foundation principles. To discover the essential values of society he must examine the fundamental needs of the social structure, since they are the Alpha and Omega of all organized educative and objective effort which the individuals of the group manifest through some form of coöperation.

The Interpretative Need

A careful observation of organized society reveals the necessity of adequate physical and social adaptation. But *adequate adaptation* implies *adequate interpretation*. The *interpretative need* of society has precedence over its other needs since it is basic to all other needs. Until an individual is able to interpret rightly his natural and social environment he is unable to contribute consistently to his own welfare and to that of his fellows. "Adequate interpretation" depends primarily upon basic experience and a mastery of the tools of interpretation.

The Language Tool. — Since one cannot make rapid or extended progress without comparing the experiences of the race with his own, it is evident that practically the first step in formal education is to acquaint the child with the keys which unlock these experiences. Without the help of conventional symbols with which to interpret thought, each individual will need to start at the beginning, thus being barred from the experiences of others, the basic rung of progress.

Basic Experiences. — It is absurd to think of a language without the experience or content side. A symbol implies both form and content. The early part of a child's life is

spent in acquiring notions and in associating them with accepted oral symbols. In so far as these notions and symbols are in accord with accepted usage the child is making rapid progress in the control of its environment. The symbols introduced by the school are strangely new. Marks, now, as well as sounds are associated with the notions already in stock. The child's early school experiences represent his effort in making associations between written symbols and his ideas. Too often the method employed to aid him in acquiring the written symbol causes him to short-circuit the written with the oral symbol, thus making it little more than a "sounding brass or a tinkling cymbal." Many of the more recent devices in elementary reading are employed to correct some phase of this evil.

From this early beginning, throughout the school life of the pupil, there is a constant effort on the part of the school to increase his efficiency in the use of language. Fundamental conventional symbols, basic to reading, writing, spelling, formal language lessons, composition, rhetoric, and grammar, are the tools which the child should have in his interpretative kit. With these tools fairly well mastered, the experiences of the race are accessible to him. Through a study of the natural sciences he learns to interpret the forces of nature; through a study of mathematics he learns to control quantitative relations; through a study of history, civics, literature, painting, sculpture, and music, he learns to interpret the thoughts and emotions of men.

A Research Ideal. — Though skill in the use of a language in the broader sense will help one to interpret adequately the sciences and arts as organized and expressed by man, it will not necessarily lead to that more subtle and original interpretation of fundamental principles which is essential

to discovery and invention. This form of interpretation depends upon a *research ideal*, or what recently has been termed the "scientific attitude of mind." To interpret the sciences as man understands them is only to keep step with human progress; to interpret them in an original way is to be the vanguard of progress itself.

One who possesses the research ideal in a particular field of thought is free from the traditional thought and emotions that hamper truth in that field. One so mentally constituted will never incite a mob, though he will demand an investigation of the charges preferred against the culprit. He will not subscribe to partisan politics simply because it is partisan. He will never be found in a band of religious enthusiasts who have solved the problem of religion in their own particular way; neither will he imitate a moral code. Fundamental principles rather than popular acceptance will influence the choice of his standards. Ethically he will search for and examine data that throw light upon the abiding principles underlying conduct. In brief, the scientific attitude of mind is a longing to search for truth, including an effective mental habit of approaching it. It is directly opposed to emotional attitudes, prejudices, instinctive impulses, and habitual judgments. Many have a clear notion of the importance of this quality of mind, though relatively few have attained it in a functional way.

At the very end of more than a hundred years of brilliant achievement in the pure and applied sciences, it seems rather strange that this ideal does not prevail more extensively. The method most needed to create it is of such a character that it must be supplied by experts in educational psychology. One thing seems probable, however, and that

is that method is a more significant factor than subject-matter, in its formation. It is also fairly well established that a research habit acquired in a specific field will not transfer in full to another field. For example, it is common observation that many professors in the universities who hold their positions and sustain their reputations on the research work which they have done, conduct their recitations in a way that is anything but conducive to the habit of research and self-activity. A research ideal, not a research habit, will function in distinctly different types of work.

The research work that is often done by assistants in the colleges and the universities has produced some excellent results. It has carried over to many of the elementary schools which are directing some experiments, the prime object of which is to establish this scientific ideal. We have scarcely begun in this field of endeavor.

The *interpretative need* includes a mastery of the language, an abundance of basic experiences, and a research ideal.

Skill an Important Need

Though it is essential that each individual of society adequately interpret his natural and social environment, it is equally essential that he employ such knowledge for the betterment of society; that he turn it to some worthy account. In order that this may be realized, more and more time has been given to the applied arts and sciences by educative agencies.

The scientific output of the two centuries just passed, culminating in the brilliant achievements of the latter half of the 19th century, reveals the possibilities of our natural

resources. The application of science has transformed the world, and by so doing has imposed new responsibilities upon society. This transformation has created a need for a high degree of skill on every hand. It is not strange, therefore, that in the schools throughout the country there is an increasing number of commercial high schools, departments of agriculture, home economics, manual training, and trade schools, both elementary and secondary. These new departments are evidence that the school is endeavoring to develop this phase of social efficiency.

Fundamentals Reduced to Habit. — The adjustment of the school to meet these needs has made those who guide the schools keenly sensitive to the importance of *habit*, either as mechanical skill or as a consistent mental attitude. In every subject there are certain fundamental elements upon which the rest of the structure depends. To neglect these is to insure wasted energy. One cannot proceed far in arithmetic without habituating the four fundamentals, tables in denominate numbers, the meaning of percentum, the relation of the base, rate, and percentage, and the relation of the radius to the circumference. Neither can one proceed far in geography without knowing the directions, latitude, longitude, the physics of air and water currents, and principles involved in the distribution of water. It is unfortunate that there is so little accurate knowledge of what constitutes these essentials. The fundamentals should be as clearly marked out in geography, history, and physiology as they are in arithmetic. When clearly defined, as in arithmetic, it is the business of teachers to see to it that they are habituated.

Within relatively recent years some worthy plans for the teaching of habits have been formulated. Professor

James was a pioneer in this field.[1] The most complete method of teaching habits that has appeared is Rowe's work entitled *Habit Formation and the Science of Teaching*.[2] It was a much needed contribution in this field. This explicit work in the method of habit formation is an indication of the social need of accurate and unerring habits in the fundamentals. Method in habit formation is the response of the school to an *economic need* of society. This need finds expression in the trade schools, where skill in planning, executing, and manipulating materials and tools is required. Skill insures a maximum output of good quality with a minimum amount of energy expended.

Socializing Need

In a decidedly commercial age there is great danger that the *socializing need* of society may not be realized. Self-interest, economic competition, and specialization are likely to dwarf the broad humanitarian feelings which serve as the warp and woof of permanent social progress. Without social sympathy, skill, the ability to interpret, and the power to satisfy other needs will not insure a permanent progress.

With the application of steam, electricity, and gasoline, on land, water, and in the air, social conditions and possibilities have been modified and complicated beyond the limit of the most prophetic vision of one hundred years ago. Modern applications of natural forces have brought the wheat fields of Minnesota and the Dakotas, the orange groves of Florida and California, the vegetables of Texas

[1] *Psychology*, James. Chap. X.

[2] *Habit Formation and the Science of Teaching*, Rowe.

and Tennessee, and the corn fields of Iowa, Kansas, and Illinois, through various distributing points, into close touch with each other, and thus made it possible for the producers of each to share the products of all. The necessity of a clearing house for all of these products has made such cities as Chicago, Duluth, Minneapolis, and St. Louis possible, and thus made necessary the high degree of specialization required to produce and transport the products of the soil and their accessories.

The forms of specialization that have grown up as the immediate and direct result of the improved facilities for producing and transporting materials are closely related to the whole problem of social solidarity. Since improved methods of transportation have made great cities possible, they have been the means of throwing human beings together in great aggregations without suggesting how they are to be made agreeable to each other, happy with their lot, and helpful to the group of which they are a part. "The most immediate effect of specialization is that of individualism." It seems a case of history repeating itself. Were there countless acres of unclaimed lands, urbanization with its complicated problems would not be so alarming, but with the rapidly growing urban population, economic segregation is being enhanced and social vice is assuming alarming proportions. In these days of specialization, the "Jack at all trades" is exceedingly rare. Though energy has been conserved, the output increased, and its quality improved by specialization, nevertheless specialization has narrowed the perspective, and congealed the social sympathy of those who have become thus specialized.

Economically, society should not and will not go back to the sickle and flail. In all probability it will become much

more highly specialized than at present. It is up to the agencies of formal education to adapt themselves to the inevitable. They must counteract the effect of the changed order. The individual who performs a mere fraction of the world's labor is apt to develop an abnormal notion of the rights, both individual and social, of others.

Social Sympathy. — Social sympathy is a response to social coöperation. When it is neglected or prevented, feelings become dwarfed and perverted. Altruistic feelings are the by-product of contributory acts that are willingly exerted for the welfare of others, without any thought of personal gain. An intelligent social sympathy is made possible only through direct contact with the life work of others. Without such a contact one's attitude is sure to be sentimental, indifferent, or unsympathetic. One who has never pressed the shovel until the blisters formed or bent the back until it ached, cannot correctly sympathize with the miners who ask for a shorter day and a higher wage. The urbanite who has taken his agricultural course from an observation car, is apt to think of the farmer as a "tightwad," who sits about and enjoys waving fields of grain and lowing herds, and consequently is undeserving of the enormous prices which he exacts from his city brother. On the other hand the devotee of the farm who has only seen the city through the show window or the beautifully kept lawns, is sure to feel that the path of the urbanite is one of ease and luxury made possible by his exorbitant prices.

With these social abnormalities flourishing, it is the business of those who are responsible for the training of future generations to recognize and apply principles that make for a social solidarity. The school has already anticipated

this problem and is making some headway in its solution. It has set for itself the task of supplying the great basic experiences from which social sympathy springs, those which specialization is denying the adult. It was largely for this purpose that manual training, including all forms of wood and metal work, domestic science and the household arts, economic nature study and scientific agriculture, printing, modeling, and work in textiles were introduced. Doubtless they help young people find themselves and thus often give a bent to future vocation, but at the same time they are the means of creating a social sympathy which will function for the betterment of the group regardless of later vocational limitations.

The Ethical Need

One may have the *ability* to *discover truth*, he may be *skilled in the applied sciences and arts*, he may have a *sympathetic understanding of the work and rights of others*, and yet be a menace to society. Indeed some of our greatest criminals have had one or more of these qualities highly developed. There is a manifest need that one's acts be consistent with his judgment. That "ye shall know the truth and the truth shall make you free," is only subjectively true. Shakespeare gave expression to this thought in the character and speech of Hamlet. The more clearly Hamlet saw the truth the less able was he to realize it. He chided himself thus:

> "I am pigeon-livered and lack gall
> To make oppression bitter, or ere this
> I should have fatted all the region kites
> With this slave's offal. Bloody, bawdy villain!
> Remorseless, treacherous, lecherous, kindless villain!
> O Vengeance!

Why, what an ass am I! This is most brave,
That I, the son of a dear father murder'd,
Prompted to my revenge by heaven and hell,
Must . . . unpack my heart with words,
And fall a cursing like a very drab,
A scullion!"

Good intentions will not insure the proper ethical conduct. It is essential that judgment be supported with adequate volitional stimuli. Moral efficiency includes doing one's duty as well as knowing and feeling one's duty.

Ideals and Prejudices. — For effective ethical stimuli we must turn to ideals and prejudices in which the emotional element is more pronounced. These ideals and prejudices must be sufficiently strong to crystallize ideas and force them into action in order to determine the character of conduct. In this connection Professor Bagley says: "In essence, an ideal is an idea that controls conduct in virtue of its emotional warmth rather than in virtue of its intellectual clearness. . . .[1]

"This distinction is difficult to define in accurate terms, but it is clear enough from a practical standpoint. A man may know or believe, as a matter of intellectual judgment, that civic purity, for example, is essential to the highest type of civic life, but even with fraud and corruption rife in the local politics of his community, he may not take the slighest step toward remedying conditions. In other words, the intellectual belief is not sufficient in itself to spur him to action. Suppose, however, that civic corruption menaces some fundamental interest of life, . . . threatens to destroy one's business or reduce the value of his real estate, or invade his home, immediately his idea of its evil

[1] *Educative Values*, Bagley.

character becomes a strong positive ideal in favor of civic virtue, which incites him to effort towards its realization. The emotional force engendered by the stimulation of a fundamental instinct has gathered about the idea and turned it into a definite dynamic standard, a positive prejudice in favor of a virtue, the rationality of which he has always admitted."

It is quite certain that there are many ethical conclusions which the race has found too fundamental to admit of experimentation by its youth. It has acquired these experiences at a great expense and suffice it for the child to take its conclusions on faith. It is the business of educational forces to generate sufficiently strong ideals and prejudices in the young to safeguard their after life and consequently insure protection of the group as a whole. I refer to such universally accepted virtues as honesty, industry, fidelity, and chastity. The person who questions the worth of these virtues has little comprehension of social responsibility.

The welfare of society demands that these virtues be controlled by such dominating ideals and prejudices that there will always be the same inevitable reaction when a temptation occurs. These reactions must be automatic and positive. The clerk who permits himself to think of the good use he can make of his employer's money is running a desperate risk; the person who constantly says to himself that the world owes him a living, ultimately is inviting poorhouse supervision; the politician who permits himself to consider the possibility of using a public trust for private gain is far on the road to corrupt methods; and the young woman who permits herself to question the social sanction of chastity will need greater strength of character than

she who acts automatically in accord with the social sanction.

These virtues have cost the race entirely too much to be experimented with. Educative forces, and we have the school especially in mind, must create emotional controls sufficiently strong to safeguard them. Disloyal conduct during the World War is indicative of the fact that what we need most is not more intelligence, but higher ideals and stronger prejudices of the right sort.

Hawthorne, in "The Great Stone Face," set forth in no uncertain language the effect of an ideal upon conduct, and likewise the effect of conduct upon an ideal. Through long years of watching and expectancy Ernest developed a strong passion for the Great Stone Face. "So strong was this passion," the author tells us, "that finally his face, transformed by it, assumed a grandeur of expression so full of benevolence, that the Poet, by an irresistible impulse, threw up his hands, and shouted: 'Ernest is himself the likeness of the Great Stone Face.'"

Human thoughts and acts, whether they be directed toward unworthy ends or toward noble purposes, will ultimately establish a background of feeling which is a powerful force in the determination of human motives and hence of human conduct. It behooves the agencies of formal education to see to it that the fundamental human virtues be held constantly before those who are being educated that right feelings be engendered. Doubtless method is more potent than subject-matter in fixing these ideals and prejudices. Certain subjects and practices are especially valuable in this connection. Biography, literature, civics, school organizations, schoolroom methods, and the teacher are all potent influences for better conduct controls.

The Culture Need

An introspection of the motives that have stimulated educative effort down through the ages reveals a marked emphasis upon what is generally termed *culture*. Society has always felt a need for the cultural value in education, though it has not always been consistent in attaining it. Since cultivated men have generally been familiar with the classics the inference has been that the classics are the main source of "culture." This erroneous inference has been handed down from generation to generation with sufficient vitality to control largely the content of the curriculum. Doubtless the classics were the only organized source of contact which cultivated men had immediately following the awakening of the Renaissance, and were therefore the only source of culture. By no other means could one sit at the feet of Plato, Aristotle, and Dante, or converse with Cicero and Virgil.

The intellectual awakening of the seventeenth, eighteenth, and nineteenth centuries, resulting in scientific research, and in a broad application of the sciences and arts, transformed social and economic conditions, and thus gave to culture a healthy tone and a vigorous content. It was no longer necessary to go back to Aristotle for natural philosophy, or to Solon for guiding principles in government. Truth unfolded on every hand. Man reacted intelligently to natural law, and became conscious of his intricate social obligations. He ceased to imitate traditional practices, and began to construct his own philosophy of life in terms of the generally accepted principles of his day.

Culture began to be interpreted differently in the light of new conditions. As Professor Hanus has pointed out,

"culture now means, primarily, the capacity to understand, appreciate, and react on the resources and problems of modern civilization. These resources and problems are found in the preservation and improvement of the health, physical vigor, and physical well-being of the race; in modern government; in modern industry and commerce; in modern literature and languages . . . in history . . . and in the art treasures of all time."[1] While the classics are still believed to afford contact with cultivated persons and to this extent supply opportunities for "culture," it is not generally believed to-day that they constitute the only means of culture. With the decline in the need for the information offered by the classics, they were justified on other grounds. It was argued that they were especially rich in the stimuli that develop mental power. Hence "culture" began to mean *power* or *capacity*, and "cultural," objectively applied, meant quality to stimulate mental growth. Though no one is willing to deny that the classics stimulate growth, few indeed are willing to grant that they are richer in such stimuli than are the applied sciences and the mechanical arts.

It is as great a mark of culture in these days of scientific knowledge to maintain good health and physical vigor as to be familiar with Greek and Latin; to understand and apply natural law as to be conversant with the laws of the Medes and the Persians; to eat, dress, sleep, and spend one's leisure intelligently and gracefully as to know the distinct types of Greek art.

Culture as now interpreted means more than ability to "understand" and "appreciate," it means the skill and disposition to do, as well, — the power to react intelligently

[1] *Educational Aims and Educational Values*, Hanus.

in response to stimuli. Our secondary curricula are gradually being adjusted to this end. The old "cultural subjects" are being supplemented and occasionally displaced by subjects which more adequately prepare one to solve the practical problems of daily life. This change is in response to the saner notion of what constitutes "culture," and it is well that it is so. "When a child has entered into its inheritance, physical, scientific, literary, æsthetic, institutional, and religious — then we must use the word 'culture' to signify the state of being that has been attained." To the extent that the children of the public schools reach this goal, to that extent can it be said that the school is meeting the "cultural need" of society.

Summary. — The aim of education in its broadest sense involves both a *personal* and an *impersonal*, or social, aspect. This twofold character of the aim of education is the source of the disagreement as to what this aim is. Since society as such is the only agency sustaining organized educational effort there is no need for considering the personal, or individual, aspect in a scheme of public education. Thus interpreted, "social efficiency" seems to include what society has in mind when it taxes its members for the support of public education.

The aim of education should be adjusted to social needs and should change its content with the change in these needs. Therefore a clear understanding of "social efficiency" depends upon an understanding of the needs of society. Society needs:

1. That its individual members interpret their environment adequately.

2. That each member be skilled in one or more of the applied sciences — be skilled in some contributing vocation.

3. That each member have some contacts with the great basic occupations in order to have the proper sympathy with those so engaged.

4. That each member have ideals and prejudices sufficient to safeguard the fundamental virtues upon which the social structure stands.

5. That each member enter sufficiently into his physical, scientific, literary, æsthetic, institutional, and religious inheritance to live completely in the fullest sense.

CHAPTER III

THE GROWTH OF SUBJECT-MATTER

The Acid Test of Subject-Matter. — One proceeds but a little way in an endeavor to provide suitable materials for a course of study before he is confronted with the fundamental questions: *Is this subject-matter worth while? Will it make a strong appeal to those for whom it is intended?*

The Twofold Aspect of Worth-Whileness. — The function of subject-matter may be considered both subjectively and objectively. When such controls as knowledge, habits, ideals, prejudices, tastes, and attitudes are uppermost in the mind of the teacher, the subjective aspect of subject-matter is emphasized. When social needs are under consideration the objective aspect of subject-matter is stressed.

The worth-whileness of subject-matter in the last analysis must be determined on the basis of social needs. There is a surplus of subject-matter which will appeal strongly to the pupil, and which will establish the desired controls. The problem involved is one of selecting from this surplus of materials those of marked social significance, and of organizing them into a system which will make a progressive appeal to the pupil and which will arouse in him a desire for further investigation.

Dynamic Character of Subject-Matter Objectively Considered. — The problem of evaluating subject-matter is

ever a new one. Because of the rapid changes taking place in the social structure there is a constant demand for new adjustments. It therefore behooves teachers who feel a responsibility for the initial adjustments of their pupils to take frequent inventories of subject-matter which in no low degree determines these adjustments.

Change in subject-matter and the effect of such change upon classroom instruction are apparent on every hand. The older works on physics give a full discussion of the steam engine, but fail to discuss the dynamo, motor, and gasoline engine. Industrial evolution has made a place for the dynamo, motor, and the gasoline engine, and consequently writers of recent books in this field have included them.

When exploration and discovery are the major occupations of a nation its geographers are concerned mainly with *place geography*. Under these conditions the direction and extent of routes, the location and size of areas, and the location of boundaries constitute no little part of geographical material.

After a nation has sown its "wild oats," so to speak, its interest shifts to causes of natural phenomena, of political and industrial conditions, and to the availability of its natural resources and products. Fertility of the soil, variety and extent of crops, mineral and timber resources, ways and means of transforming raw materials into finished products and of transporting such products, become facts of much value to the children who expect to participate in such a life.

Origin of Subject-Matter

Any serious attempt to select subject-matter for the schools of any generation must take into account the needs

which occasion such subject-matter. To the extent that the needs of any generation which give rise to subject-matter are identical with present needs, to that extent will the materials of a former generation be adequate for the present generation.

Desire to Know, a Fundamental Need. — Pedagogical literature discloses two distinct theories as to the classes of needs which have determined the organic development of subject-matter. One of these theories is based upon the notion that man is by nature imaginative, speculative, groping, systematic, and logical. A logical corollary to this theory is that man naturally organizes fragmentary knowledge into systems regardless of any conscious utilitarian need of such a system.

In this connection Professor Judd says: "The behavior [of primitive man] was dominated by fantastic imagination. Primitive society put its members through the most onerous tasks to satisfy needs which were entirely of the imagination's making. To understand primitive customs one has to study primitive myths."[1]

According to this theory, beliefs, creeds, the arts, and the sciences developed from vague imaginative beginnings into sane and logical productions because of the "clash of the wits" of the individuals of the group and of the groups themselves. These intellectual clashes usually resulted in a partial or complete acceptance of the theory which made the greatest intellectual appeal. "Each tribe was content to believe its own myths," says Professor Judd, "until it began to come into intimate relation with other tribes. Then the clash of social opinion made men skeptical. There is nothing more jarring to one's primitive scientific theories

[1] *Psychology of High-School Subjects*, Judd. Chap. XIV.

than to find that one cannot persuade his neighbor. So it was with the Greek thinkers. At first each developed his own views without restraint, but soon he met some one who had evolved other views. Now came the clash of wits which characterizes that period of Greek skepticism that introduced the first great constructive period of western thought. During the period of skepticism the Greeks learned that thought, to be productive, must be critical as well as imaginative.

"Thus, through social clashes followed by revision, internal or theoretical consistency was established. This criterion of internal consistency is the one which is used even to-day in testing much of our scientific thinking. The man of science is willing to go through a long and laborious comparison of different ideas for the purpose of testing their internal consistency. *It is only in the latest and most elaborate stages of science and industry that internal consistency and practical applicability are both recognized as equally valid methods of testing thinking.*"

Solution of Practical Problems a Fundamental Need. — The other theory of the origin of subject-matter is based upon the thesis that man creates it to solve his practical problems. In defense of this theory Professor Charters says: "New subject-matter is formed when difficulties which cannot be handled by subject-matter already formed are met. Or in other words it is created in response to some need. For instance, it is commonly held that botany had its early beginning in sickness and disease, for whose cure the tribal women collected herbs and studied them. The science of chemistry sprang from alchemy through the desire of man to find a rapid means of changing the baser metals into gold. When the Nile swept away

the line fences of the ancient Egyptians each year, geometry was invented to determine the boundaries of the fenceless farms. Astronomy, in the form of astrology, probably began in an effort to foretell disasters and good fortune." [1]

These two very different theories of the origin of materials which have been advanced by two recent and influential writers of textbooks on educational theory, seem to blight any hope one may have of a science of education. If teachers cannot agree upon the agencies which create subject-matter, is it reasonable to believe they will agree upon the subject-matter to be used in the schools and the method to be employed in its presentation?

A Compromise View of the Origin of Subject-Matter. — Before throwing our hands up in despair let us extract some wholesome philosophy from Saxe's little poem, "The Blind Men and the Elephant."

THE BLIND MEN AND THE ELEPHANT

It was six men of Indostan
To learning much inclined,
Who went to see the Elephant
(Though all of them were blind),
That each by observation
Might satisfy his mind.

The *First* approached the Elephant,
And, happening to fall
Against his broad and sturdy side,
At once began to bawl:
"God bless me! but the Elephant
Is very like a wall!"

[1] *Methods of Teaching*, Charters. Chap. II.

The *Second*, feeling of the tusk,
Cried: "Ho! what have we here
So very round and smooth and sharp?
To me 'tis mighty clear
This wonder of an Elephant
Is very like a spear!"

The *Third* approached the animal,
And, happening to take
The squirming trunk within his hand,
Thus boldly up and spake:
"I see," quoth he, "the Elephant
Is very like a snake!"

. . . . . .

And so these men of Indostan
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong,
Though each was partly in the right,
And all were in the wrong!

— John G. Saxe.

If educational theorists seem to differ it is probable that they have approached the educational elephant from slightly different angles. Broad experience and a sympathetic attitude is needed to correlate theories which at first seem strangely contradictory.

The instinctive desire to win, the angle of perspective from which men view their environment, the ebb and flow of emotions, a difference in aims and basic experiences, and a wholesome individualism lead educational writers to overstress one aspect of education and to slight or wholly ignore other aspects equally significant.

While it seems reasonably certain that Greek philosophy sprang from the "fantastic imagination" of the elect of the Greek people and was "tempered into theoretical con-

sistency" through the "clash of wits" and afterward was considered valid by virtue of its application, it does not follow that all subject-matter had its rise in this way. The probability is that most of the materials taught in the early geographies were accumulated government reports from various seamen, explorers, and discoverers, interspersed with theory for the purpose of securing unity. It is very probable that those who needed this information were the ones who sought it, just as commercial knowledge was sought in the private commercial schools of this country a generation ago and still is to some extent.

Most of the knowledge which constitutes modern physiology, hygiene, and sanitation was acquired by the medical profession in its effort to solve the perplexing problems which it faced daily. It was not the "fantastic imagination" which was responsible for the isolation, controlled culture, and the toxine of the bacilli which are now well understood. The fact is it was a desire to find some practical way of alleviating human ills which drove men to search out and control these smallest individuals of the organic world.

The science of agriculture could never have been developed on the frontier nor on the streets of a great city. It sprang up in a fragmentary way in the older and more thickly populated agricultural communities. So long as a country is new and vast tracts of land are to be had for the asking, the schools show little concern in a scientific knowledge of soils or a balanced ration for animals.

When, however, the frontier has vanished and farms have been abandoned because of low fertility; when consumption increases more rapidly than production, men seriously concern themselves with the problems of production. The

wiser persons of the social group begin to lie awake nights meditating over ways of improvement. Experiments are conducted in feeding, in planting, in improving soil fertility and, in fact, in every phase of farm life for the purpose of improving farm conditions. When the results of these investigations are compiled and edited, subject-matter in agriculture is at hand.

As implied above, the subject-matter of the commercial branches had its inception in the private schools. No stronger evidence can be had of the social stress back of subject-matter than its association with private schools. These institutions were in the school business for profit. Consequently it was presented only when there was a strong demand for it. After the demand for new subject-matter becomes great, the public schools usually sense it and finally incorporate it in the curriculum.

On the other hand, it is equally evident that much of our material is the result of man's instinctive desire to know more, and to organize fragmentary knowledge for the purpose of revealing to others what he believes. For example, geology, astronomy, botany, zoölogy as pure sciences were created because man became curious about his environment. By means of comparison he began to discern likenesses and differences. Principles were discovered and a new organization founded upon these principles was created.

It is instinctive to want to know what one's associates do not know, and to want to tell them about the new possession. Those who have these instincts to a marked degree will travel to the farthermost parts of the earth to seek knowledge and will travel no less far to reveal it to their fellow men. They will put forth extraordinary

energy in following a new line of thought to its satisfactory conclusion. These instincts, coupled with ability, are responsible for much of the thought that has concerned mankind. These instincts are prominent in teachers of marked success.

This twofold view of the origin of subject-matter gives an educational perspective which is interesting to administrator and teacher alike. The child's native and social needs demand material which has been sifted by both of these processes. On the one hand, subject-matter should stimulate the imagination, arouse interest in principles, and lead one to enjoy analytic and synthetic processes. On the other hand, it should touch the motor springs to action and result finally in practical knowledge, ideals, and worthy habits.

This twofold aspect of the origin of subject-matter means that materials selected for the schools must have both a social and a pedagogical sanction. It means that formal material must be considered, first, from the standpoint of the social service it will render; and secondly, from the standpoint of the appeal it will make to the constructive imagination of the child. It means that he who is responsible for the course of study will need to stand for fundamental psychic principles, a good organization, a close sequence of topics, and a unifying purpose. Furthermore it means that he will need to check materials in terms of social needs. He will need to clean house constantly in order to remove materials long since worthy of the educational scrap pile and to substitute much-needed materials for them.

The constant need of a readjustment of subject-matter and method, and the frequent reticence of teachers towards

this readjustment, arouse an interest in the *negative forces* which are responsible in no small measure for the slow evolution of subject-matter.

Agencies Which Operate to Conserve Subject-Matter

It is quite as interesting to observe the agencies which operate to retain subject-matter in the course of study long after the need for it has passed away, as it is to observe those agencies which operate to keep subject-matter in harmony with the shifting needs of the group for which it is intended.

Imitation a Cause of Conservation of Subject-Matter. — The presence of imitation in human nature is the most persistent of the conservative agencies. Teachers are inclined to teach the texts *they* were taught and in much the same manner. Identical forms, similar procedure, and like interpretations and applications are passed along from teacher to teacher with wonderful precision and fidelity.

As one finds faithful reproductions of northern plants isolated on mountain tops in semitropical regions, so he finds faithful reproductions of a once needed subject-matter and method left isolated in the curriculum through failure of those who are responsible for it to keep in touch with the social and pedagogical changes which have taken place.

More than seventy years after Horace Mann had preached against the folly of the alphabet method of teaching reading, a committee in charge of the educational survey in Ohio found a few teachers still applying faithfully the alphabet method of their fathers.

Recession from Content to Form a Cause of Retention. — The natural tendency to recede mentally from the content to the form through which the content finds expression is another conservative agency in education. Students of language often allow themselves to become disciples of some particular technique, or phraseology. Students of arithmetic, geography, and history sometimes become worshipers of the method employed and lose sight of the end to be attained. This natural tendency to substitute the form for the thing which it reveals is not infrequently a millstone around the throat of progress.

Group Teaching a Cause of Conservation of Subject-Matter. — Perhaps no single agency has been quite so effective in delaying the natural evolutionary progress of subject-matter as that of group teaching. Group teaching, while meritorious in many ways and for practical reasons quite necessary, tends strongly to stamp approval upon *fact getting* instead of upon getting the relative value of the fact obtained. It requires little misapprehension to go from "fact getting" to word juggling, which easily becomes a fetish. Effective methods of teaching will prevent these serious consequences.

A Sense of Relative Values is Necessary to Progress. — One's sense of relative values determines in a large measure the modification he effects in the curriculum. One who sanctions a sailor's geography; a history of war and conquest instead of a history of the activities of peace; a literature dealing with erotic, morbid, and fantastic outbursts of character instead of the well-balanced, consistent, and self-sacrificing endeavor of noble men and women; a physiology of structure instead of a physiology which stresses those processes upon which happiness and

efficiency depend; an arithmetic emphasizing an application of principles instead of principles for application, — fails to sense the relation of the school to individual development and social service.

Persons responsible for public-school curricula can ill afford to be indifferent to social needs. They should recognize the fact that the materials of the curriculum are intended as means to an end and not as an end in themselves. The first test to which subject-matter should be submitted is that of worth-whileness in the sense of meeting social needs. When it has stood this test, it is then time to consider it from the standpoint of the appeal it will make to the child.

The Child Factor in the Evolution of Subject-Matter. — With an improved knowledge of general psychology, with improved methods of determining children's reactions to subject-matter, with improved methods of determining the progress of children and the factors involved in that progress, there has come a deepened sense of the need of a better knowledge of the relation of subject-matter to the child's interest.

This deepened sense of the finer adjustment of subject-matter to the interests of children has already borne fruit a hundredfold, and consequently has been no little factor in determining change in subject-matter.

Adaptation of Subject-Matter to the Child's Interests

No better examples of the adaptation of subject-matter to the instinctive tendencies of the child can be cited than those of reading and arithmetic. Excepting the so-called method

readers, which in reality are *methodized* and not *psychologized* materials, most of our newer readers are fine examples of the adjustment which has taken place under the inspiration of this point of view.

Present Status of Reading. — The primer and the first and second readers of the newer sets of readers are examples of the recognition which has been given to the child's predominating interests. The pupil fresh from the kindergarten or the home has had a touch of make-believe and fancy. His imagination knows no bounds. Like the fabled frost it travels far and near in boundless space. The folklore and fairy tales of these first books are admirably suited to nurture this most fundamental psychic process and to utilize it in mastering the technique and in forming the habits necessary for further progress.

By the time the third and fourth grades are reached the imagination is no less marked, but it has reached another phase of development. In the preceding years the plausibility of the "tale" was never questioned. In fact the question of probability never arose. In these later grades reason and experience begin to assert themselves. Tricks are still enjoyed but they must approximate the truth. Practical jokes are immensely enjoyed in these grades, especially jokes played upon animals or by animals. This period is peculiarly adapted to animal stories. *The Story of a Donkey*, *The Story of a Toad*, most of the *Mother Westwind Stories*, *Merry Animal Tales*, and some of Thompson Seton's and Warner's stories are admirably suited to third and fourth-grade children. The animal hero is of rare interest to these children.

The psychic outlook, so far as reading is concerned, is somewhat changed by the time the intermediate grades are

reached. Heroes still hold a prominent place in the child's interest. The animal hero, however, yields in interest to the human hero. Greek myths and similar stories receive an astonishingly hearty response. Robin Hood is a fine example of the sort of hero that is enjoyed by children of this age.

Unfortunately the terminology of these stories offers a serious handicap to their usefulness. Literature of this kind is full of difficult words which are seldom used in any other connection. Perhaps a wise revision of these stories for the purpose of eliminating unusual words is advisable. At any rate this particular difficulty should be partially or wholly removed, either by revision or by a better selection. The materials for the grammar grades have kept pace with the psychic development of the child. Heroes are still in demand. Neither the animal hero nor the human hero who dominates and controls for personal and selfish reasons will do. The heroes of Tennyson's *Idylls of the King* meet a hearty response. Moreover, the young people of the grammar grades are already contemplating life's problems. They are interested in most phases of literature which portray human endeavor in pursuit of lofty ideals.

Most of our newer readers have been adapted either consciously or unconsciously to these psychic outcrops of the children of the elementary school, who are on their forward march toward racial ideals and personal and social responsibility.

Present Status of Arithmetic. — Those who are responsible for the newer arithmetics, especially the books for primary children, have shown much appreciation of the psychic needs of children relative to the mastery of numbers. The

materials have been made much more concrete and attractive. The sequence of materials to problems is closer and the employment of materials within the experiences of the children is much more common, all of which mark a decided advance in formal number work.

Present Status of Other Subjects. — Other subjects reveal a marked adjustment of material to meet the psychic needs of children. The old deductive grammar is all but gone, physiology has been reorganized in the interests of children, historical materials have been vitalized through the use of letters and stories of the children of earlier times. Even spelling and writing are recognized as human instruments for the conveyance of thought instead of rare accomplishments through which one can achieve renown.

The process of reconstruction based upon the social and psychic needs of children has been steady and commendable. It must ever go forward. Social needs will continue to change and a better insight into the laws of mind will necessitate constant adjustment of subject-matter. A halt means a stay of progress, while a continuous adjustment of materials in response to new conditions is progress itself.

CHAPTER IV

ORGANIZATION OF SUBJECT-MATTER

Living Organisms. — An examination of simple plants and animals leads one to the conviction that the distinct parts of each are in harmony with the welfare of the whole. When *parts in a complex arrangement* are so conditioned that they work in accord with the purpose of the greater whole, the whole is an *organism* and its *structure* is *organic*. All life operates and reveals itself through organisms. From the simple structure of the amœba to the highly complex and beautifully adapted organism of man, we find processes conditioned and determined by the character of the life that is revealed.

In the light of biological science it is sufficient to suggest that the parts of living organisms have been developed and assembled through the constructive processes of hereditary variation and selection. The law of the survival of the fittest determines the varying structures of living organisms.

Inanimate Organisms. — Not only does life manifest itself directly through the organism which nurtures and reveals it, but it reaches out through this organism to its immediate environment which it adapts and arranges for the purpose of extending its freedom. Thus man has laid hold of his environment and organized it. He has cut trees with which to construct houses, built boats and bridges with which to cross streams, made tools with which to

cultivate the soil, invented symbols with which to convey thought, and arranged experiences with which to uplift his fellow men.

Back of this external arrangement of the things of his environment are unmistakable signs of *purpose*. He arranges, rearranges; builds, destroys; combines and recombines in accord with his shifting ideals and purposes. He arranges the stones, mortar, and timber of his environment in a way to realize a certain purpose and he calls the arrangement a house. He arranges materials in a way to realize another purpose and he proclaims the arrangement a barn; and still a different arrangement to fulfill another purpose, and he has a bridge. In each case the arrangement is a structure because it reveals purpose. It is an organism because the parts have a *distinct function* as well as a general and coöperative function in the realization of the purpose of him who assembled them. The *ideas* — houseness, barnness, and bridgeness — were the forces which assembled and unified the parts of which the prescribed and conventional forms are composed.

Inanimate organisms of human origin spring from the brain of man and vary with his states of mind. His aims and purposes are the initial forces which assemble materials from the remote parts of the earth and arrange them into organic structures. New structures have sprung up in this way to meet his needs.

Not only are man's aims and purposes realized through the assembling of concrete materials, but they find fruition through an understanding of organisms which reveal the experiences and purposes of others. The Monroe Doctrine, the Missouri Compromise, the Free Wool Schedule, Riley's *Old Swimmin' Hole,* Stevenson's *Treasure Island,* Holmes's

Old Ironsides, Wells's *Geometry*, Sanford and Brown's *Grammar*, and Bagley's *Educative Process* are all organisms which have been created to realize certain aims of the persons who created them. On the other hand, they serve to stimulate and develop those who will delve into them.

School Concerned with Twofold Aspect of Structure

The school must concern itself with a twofold aspect of structure. In so far as pupils are encouraged and directed to develop and reveal original purpose they will need to be familiar with the processes of collecting and assembling materials to this end. This is the creative side of school direction and by no means the least valuable, though usually it is the least satisfactory of school accomplishments.

Develop Creative Ability. — Practically all subjects lend themselves to the development of creative ability. Success or failure depends upon the insight and power of the teacher to stimulate the latent creative tendencies of her pupils and to furnish them with appropriate skills and materials with which to make creation possible. Original design in the manual arts; letter writing, short stories, descriptions, and dramatizations of various forms in English; original data, comparative maps, graphs and plots in the social sciences; and concrete problems of a personal nature in mathematics — all afford opportunity for originality in both the creation and expression of ideas.

Training in creative thinking includes the development of an awareness by the pupil of the interrelation of purpose and structure. He must be impressed with the fact that ideas are revealed only through structure, and that the

success of an attempted revelation depends upon both the quality of the idea to be revealed and the suitability of the structure created to reveal it.

A few illustrations will serve to emphasize this viewpoint. Certain persons purposed to employ electric energy in the solution of social problems, consequently they constructed the electric doorbell, the telephone, and the electric fan. Another purposed to relieve mankind of the annoyance of sound, consequently he invented the muffler. Longfellow wanted to impress the world with his notion of the impelling force of genius, and he created *Excelsior*. Jordan desired to reveal the notion he had of the impelling force of instinct in the salmon, and he constructed the *Life of the Salmon*. Holmes was impelled to reveal the idea of national ingratitude in a specific instance, and he constructed the poem *Old Ironsides*. Hawthorne desired to reveal his notion of the influence of an absorbing ideal upon an individual, and he wrote the story of *The Great Stone Face*.

Develop Interpretative Abilities. — It is inconceivable that ideas and purposes are consciously revealed by any means other than that of structure. They may be revealed by a simple organism. Usually, however, they are revealed by a series of processes resulting in a complex organism or highly organized body. It is the business of the teacher to lead the child to a clear understanding of the interrelation of purpose and structure that he may be able to express his own ideas effectively and be qualified to interpret adequately the ideas of others.

Progress depends upon ability both to create and to interpret structures. Since mankind seriously began to accumulate the organic experiences of the race for its own

advancement, interpretation of structures has been taken more and more seriously. The child is sent to school to learn the basic experiences of the race in order that he may profit thereby and thus be enabled to begin where his predecessors leave off.

Interrelation of Structure and Function

School curricula in the main are composed of highly organized and classified racial experiences. One main function of the school is to give the pupil the key to these racial treasures, that he may draw upon them in time of need. This involves a knowledge and control of the so-called fundamentals, such as elementary reading, spelling, and the simple processes in arithmetic. It also means skill in determining purpose through an examination of structure.

Structure Reveals Function. — The first step in this process may be acquired through calling the pupils' attention to the fact that ordinarily we examine structures to enable us to get our bearings in the organic world. By an examination and comparison of the structures of the electric door-bell, the telephone, and the electric fan one early learns that they are intended to fulfill entirely different functions. The bell and gong reveal the inventor's specific purpose in creating the electric bell. The mouth and ear pieces with the wire connections indicate the purpose that initiated the telephone, while the paddle-like arms of the electric fan are unmistakable signs of the use to which it is to be put. One examines a building and infers that the builder intended it for a summer cottage. He examines another and is forced to the conclusion that the builder intended it for

a library. He examines a third structure and is convinced it was intended for a school. The conclusion in each of these cases results from an examination of the parts of the structure in their relation to each other and to the whole. The various parts in these structures are an *external* expression of *organized purpose.* They must have existed in idea before becoming objective realities.

The growth and adoption of conventional forms of communication have enabled civilized peoples to objectify ideas and purposes in a purely symbolic way, through the medium of language. This medium, like those of which electric instruments and buildings are constructed, is flexible and easily adapted to one's needs. Words and sentences arranged in one way force one interpretation, while another arrangement impels a different conclusion. The difference in the structures of a church and of a school is due to the character and arrangement of the parts involved. Likewise the difference between *Excelsior* and the *Life of the Salmon* is due to the character and arrangement of their parts.

If the above conclusion is sound, it is evident that the only way one has of *laying hold* of the ideas and purposes of others is by examining the *character* and *relation* of the parts of the structures created by them to reveal their purposes. In the last consideration it means a painstaking analysis and synthesis of the structures created by them.

It must not be inferred that it is the sole business of man to search continually for the purposes of his fellows. Were one, on being ushered into his room at the hotel late at night, inclined to determine all the purposes of the designer of his room before retiring, the chances are he would have little time to "lie down to pleasant dreams." Likewise should

one constantly be examining the structure of Mark Twain's *Innocents Abroad* or Irving's *Legend of Sleepy Hollow*, he might neglect to enjoy the ludicrous situations depicted by these two splendid Americans.

While it is not intended that one should spend all of his school time interpreting human purpose, it is true, none the less, that one large aim of the school should be to develop interpretative abilities. This means a mastery of both principles and technique. The structures of plants and animals are examined that we may know the function of each part in the maintenance of the structure and thereby be enabled to determine the use of the parts of other organisms.

The social sciences are examined that we may get the author's interpretation of the governments and economic practices of progressive peoples. The masterpieces of the world's greatest writers are examined that we may learn of the great messages passed on to us and may acquire the ability to understand and appreciate similar structures created for us.

Purpose Determines Structure. — Since purpose is revealed through structure it is quite evident that the structure will be no more complete than the purpose which gives it birth. Variation in degrees of clearness and definiteness of purpose finds its counterpart in variation in the quality of materials chosen and the character of the arrangement of parts. One who thinks logically will of necessity organize logically and vice versa. One not only should be, but actually is, judged by the structures he *creates* or *accepts*, whether they be the clothes he wears, the buildings he constructs, or the books he writes or reads. Of course the justness of this judgment depends upon the organizing ability of the critic.

Of necessity the school will need to deal with structures whose parts vary greatly in the character and quality of their arrangement. To the extent that this arrangement can be fully appreciated by the teacher is it possible for him to *expose* its purpose to the child.

Organization and Logical Thinking. — A definite purpose supported by a consistent arrangement of thought elements well suited to reveal that purpose is *logical thinking.* A structure which is beautifully adapted to reveal logical thinking is a logical structure. As Charters has pointed out, a logical organization consists in the arrangement of the essential parts of an organism in the *order of their degree of relevancy* to the organizing purpose.[1] It is inconceivable that one should teach efficiently without possessing the ability to arrange the specific experiences needed into a logical whole and to make them explicit first, to himself, and second, to those whom he teaches.

Means of Determining a Unifying Idea. — Since organization implies a central idea, it is important from the standpoint of conservation of energy that this "unifying idea" be "sensed" or anticipated as easily as possible. It is usually, though not always, implied in the "topic," the "heading," or the "subject." If it cannot be discerned through these sources, a casual but somewhat analytical examination of the entire structure may be necessary to discover it. Not until such a "unifying idea" is determined is it possible to *evaluate* the parts or determine the "order of their degree of relevancy to the unifying idea." If the parts cannot be unified under the tentative topic selected, one of two things is probable; either the tentative "unifying

[1] *Methods of Teaching*, Charters.

idea" is not the one intended by the writer or the organism is illogically and poorly arranged.

Ability to arrange the parts of a selection so they will readily reveal its central idea or to evaluate an arrangement of parts through an examination of the order of that arrangement, is a rare quality among the beginners in the teaching profession. Teachers of special and general methods in training schools for teachers should not estimate too lightly the merit of this sort of training.

Teachers' Organizations. — In order to reveal the variability in the capacity of teachers in service to organize and to use organizations, the following comparative organizations are given: The "Story of the Quail"[1] was given to a mixed group of elementary teachers of a good city system in the Middle West. The papers handed in revealed a wide variation in the ability of these teachers to organize. Only a very small per cent of those who made the trial were able to approximate the excellent results obtained by the strongest of their number. On the other hand, the outlines of the great majority approximated the rather inferior one selected at random from those handed in. Two type organizations selected from these papers are given below in the ascending order of their value.

No. 1

A Story of the Quail[1]

1. Mr. Bob sits on the fence and gives forth hearty calls.
2. Sharp-eyes is in the grass picking seeds.
3. Mr. Bob's experience with a hawk.
4. How Mr. Bob and Sharp-eyes find each other.
5. The quails' nest.

[1] *Our Common Friends and Foes*, Turner. American Book Co.

6. The young quails.
7. The enemies of the quail.
8. Man the greatest enemy.
9. Struggle of the quails against the brutal acts of man.
10. The number of quails left.
11. How they spent the winter.
12. In the spring they built their nest near the place where they were reared.

No. 2

A Story of the Quail

I. Its haunts.
   1. In summer.
      A. In the meadow.
      B. In the fields.
      C. By the brook.
   2. In winter.
      A. Among briers and weeds.
      B. In the woods.

II. Its calls.
   1. Those of the male.
      A. Bobwhite.
      B. Who-kee.
   2. Those of the female.
      Ka-loi-kee.

III. Its food.
   1. Animal.
      Cutworms, grasshoppers, caterpillars, chinch bugs, potato bugs, beetles, etc.
   2. Vegetable.
      Seeds of weeds.

IV. Its offspring.
   1. Where reared.
      A. Nest.
      B. Eggs (period of incubation).
   2. Number.

3. Habits.
4. Dangers encountered.

V. Its enemies.
1. Birds of prey.
Hawks and owls.
2. Domestic animals.
Cats, dogs.
3. Man.

VI. Its value to man.
1. Reduces number of
A. Harmful insects.
B. Harmful seeds.
2. Gives enjoyment.
A. Cheery notes.
B. Beautiful form.

An examination of these organizations reveals two very distinct notions of the intrinsic function of the story. In order to get at the underlying cause of such a wide variation in organization each of these teachers was asked to state as definitely as he could the *teacher's aim* in presenting the story. The following statements are typical of those handed in.

1. To stimulate the children's interests so each child will observe nature.
2. To interest children in nature work through the Story of the Quail.
3. To assist pupils to become better readers.
4. To teach children the life of quails.
5. To get the thought of the printed page.
6. To acquaint the children with the events in the life of the quail.
7. To teach the life of the quail, its haunts, calls, offspring, food, enemies, and its value to man.
8. To give the child a clear insight into the facts of nature which enter into the life of the quail.

9. Specific.

To lead the children to a definite understanding and appreciation of the haunts, habits, food supply, offspring, and enemies of Mr. Bob and his mate.

General.

To lead the children to a better control of the printed page, and to a better understanding and appreciation of the habits, life history, and economic significance of quails.

A critical examination of these aims shows a wide variation in the notions which these teachers had of the function and structure of this particular subject-matter.

Indirect and Specific Functions of Subject-Matter. — The purpose which the majority of these teachers intended to realize through the use of this story might well have been realized through the use of other stories. It was not dependent upon and peculiar to the specific organization of this story, consequently the function which they attempted to utilize is known as the *indirect function*. This function is nicely emphasized in numbers 3 and 5. It is so general that it readily applies to any selection capable of being understood by the children. No. 1 could be applied to any treatise upon nature, while Nos. 2, 4, 6, and 8 might be applied to almost any story or discussion on the life and characteristics of quails.

Such an indirect use of material indicates a number of teaching ailments. It may reveal inability to organize, indifference, laziness, or other defects of which the profession is aware. This vague notion of the specific intrinsic function of subject-matter is not complimentary to the teacher and seldom should be tolerated.

It is evident that No. 7 can apply only to those selections which include all of the factors in the *Story of the Quail*. The teacher who gave this aim had definitely determined

the specific purpose of the story and evidently intended to *expose* this idea to the child. No. 9 goes a step farther. It proposes to make this story reveal something to the child which no other story can reveal. It recognizes the specific intention of the story and appreciates the fact that this intention is revealed through *specific personalities*. Such an appreciation gives a warmth and an individuality to the story that cannot be secured through No. 7. No. 9 also recognizes that, while ultimately children should get a better control of the printed page and a better understanding and appreciation of the "habits," "life history," and "economic significance of quails," this can be secured only by getting the "control," "understanding," and "appreciation" of each individual selection which has a *specific intrinsic function to perform*. In other words, the best way to realize generalizations is through the mastery of specific structures. The *indirect values of subject-matter* will come as a *by-product* while the pupil is mastering the specific values. *Any other order of procedure is poor economy*, and *poor pedagogy*.

If the specific function of each selection studied in school is to be revealed to children, it is absolutely essential that the teacher not only be able to determine this function through a careful organization of the parts of the selection, but that he lead his children to an understanding of the logical arrangement that they too may *understand* and *appreciate* the specific purpose of the selection.

Much of the vagueness of classroom teaching results from the monotonous grinding of details. Like posts in the fence, each fact in turn seems to occupy a single and isolated place in a series of details. Organization upheaves the monotonous plain of thought and converts it into moun-

tain peaks and valleys. It takes cognizance of the relativity of the parts of subject-matter by breaking up a unit mass into its coördinate and subordinate parts, and thereby displays these in graphic representation to the mind.

Organization and Retention. — A unit of subject-matter should offer no difficulty of retention to the teacher while the recitation is in progress. Indeed, a strong argument for organization is that it reduces facts to order and thus materially reduces the number of units to be retained. The teacher who has not reduced her subject-matter to organic terms will be unable to proceed logically or forcibly. More embarrassment ensues from a confusion of the relevancy of parts than from any other source. Any subject-matter that is worthy of presentation should be presented in the most convincing way, no matter whether it be in the primary and intermediate grades or in the high school and university. Much of the twaddling in primary teaching is due to the fact that *sentiment* rather than *insight* determines the presentation of the materials to be taught.

Some Typical Organizations. — The following organizations are compared for the purpose of forcing the generalization of this very simple and fundamental truth.

FIRST ORGANIZATION

Unit of Instruction — William Tell

1. Tyrant Gessler orders people to bow down before his cap.
2. William Tell refuses to do so.
3. Gessler orders him to shoot the apple on his son's head.
4. Tell begs to be excused but is told that he will be shot if he refuses.
5. Tell shoots the apple from his son's head.
6. Gessler displeased, people glad.
7. Tell was prepared to kill Gessler if he missed the apple.
8. Later he did kill Gessler.

SECOND ORGANIZATION

Unit of Instruction — William Tell

I. His country.
  1. Its present government.
  2. Its government in Tell's day.
    A. Its ruler.
      a. Gessler.
II. His difficulty with Gessler.
  1. Cause.
  2. The danger incurred.
III. Terms of his freedom.
  1. Must shoot apple on his son's head.
  2. The effect of this requirement upon Tell.
  3. The effect upon Tell's son.
IV. His acceptance of Gessler's terms.
  1. Cause.
  2. His frame of mind.
  3. His boy's spirit.
V. His success.
  1. Its effect upon Tell and his son.
  2. Its effect upon Gessler.
  3. The final outcome of it.

The first organization is one which was taken from a student teacher's plan book. It consists of a series of topics in the order of their presentation in the story. It suggests the forward movement of the story but does not provoke reflection or reveal motives. The second organization keeps the hero constantly in the foreground. The five large coördinate points refer directly back to the main topic. The subpoints of each main topic indirectly revert back to the same main topic and establish a logical coherence of all the parts. This arrangement of parts to reveal the degree of relevancy of each part to the whole is a *logical organization*.

A Lesson in Seventh-Grade Geography

First Organization

Unit of Instruction.

Boundary, position, and size of Australia.

Organization of subject-matter.

I. Bodies of water surrounding Australia.
   1. Name all of the oceans.
   2. State their directions from Australia.
   3. Name all oceans serving as boundaries to Australia.

II. Position.
   1. Name directions from America and from your home.
   2. Name directions from other continents of the world.
   3. Distance from America (will have children add the miles as indicated on the ship routes).
   4. Latitude and longitude.
      A. Comparison with the latitude of your home.
      B. Name tropic and the number of degrees from the equator, that passes through Australia.

III. Size.
   1. Name continents in order of size.
   2. Compare Australia with the United States and with Europe.

Second Organization

Location, Area, and Population of Australia.

I. Location of Australia.
   1. Relative to other continents.
      A. North America.
         a. Its direction from Australia.
         b. Its distance from Australia.
      B. Europe, Asia, and Africa.
         a. Direction of each from Australia.
         b. Distance of each from Australia.
   2. Relative to latitude and longitude.
      A. Latitude.
         a. In degrees.

B. Longitude.
a. In degrees.
3. Relative to bounding waters.
A. On the north.
a. Timor Sea, Arafura Sea, Gulf of Carpenteria, Torres St.
B. On the east.
a. Coral Sea, Pacific Ocean.
C. On the south.
a. Great Australian Bight.
D. On the west.
a. Indian Ocean.

II. Area.
1. In surface miles.
2. In comparison with other countries.

III. Population.
1. Total.
2. Relative.
3. Density of.

A Lesson in Eighth-Grade Reading

First Organization

Unit of Instruction.
The poem, "Paul Revere's Ride."
Organization of subject-matter.

I. The story told by the poem.
II. Reading of poem.
1. General expression — joyous.
2. Articulation and pronunciation.
A. Clear.
B. Rapid.
3. Unfamiliar words.
A. Pronunciation.
B. Meaning from content.

SECOND ORGANIZATION

Unit of Instruction.

The poem, "Paul Revere's Ride."

Organization of subject-matter.

I. The Introduction.
   1. Name of the rider.
   2. The time of the ride.

II. Events leading up to the ride.
   1. The march of the British anticipated.
   2. Plans for notifying the country folk.
      A. Signals.
      B. Position of advantage by Revere.
         a. His trip across the bay to the Charlestown shore.
            (1) British man-of-war.
   3. Indications of the march.
      A. Men at barrack door.
      B. Marching of grenadiers.

III. Events immediately preceding the ride.
   1. The friend climbed the tower.
      A. View of the belfry chamber.
      B. The churchyard.
      C. Boats on the bay.
   2. Revere in readiness on the opposite shore.
      A. Booted and spurred.
      B. Alert for the signals.
      C. The first lamp — the second.

IV. The ride.
   1. Its importance.
      A. The fate of a nation was riding.
   2. Direction and character of the road.
   3. Arrival at Medford town.
      A. Occurrences there.
   4. Arrival at Lexington.
   5. Arrival at Concord.

V. The results of the ride.
   1. "The British regulars fired and fled."
   2. Revere's spirit of defiance became a precedent for American liberty.

The stress put upon the specific *intrinsic* function of subject-matter must not be interpreted to mean that power to organize is the only essential qualification needed by the teacher. It is essential but not sufficient. Teaching involves a definite knowledge of the subject-matter which the teacher proposes to reveal to the child, and furthermore, it involves skill in stimulating the child to lay hold of the thing the teacher wishes to reveal. A logical organization is required to meet the first of these prerequisites. It may or may not be sufficient to meet the second one.

Psychological Approach. — To mature and experienced persons, the presentation of subject-matter in a logical way ordinarily will stimulate interest. Less mature persons may be little interested in the logical order of subject-matter. They may be engrossed in interests wholly remote from the formal subject-matter of the schoolroom. In such an event the teacher will need to approach the new material through some of the children's active interests. In the presentation of William Tell, the teacher might find the children more interested in topic II than in topic I and in the preliminary discussion might find it advantageous to begin with this topic. In "Paul Revere's Ride" he might find topic II more fascinating than topic I, and in that event he might be justified in approaching the poem through that order of the topics. Such an arrangement of parts is known as a psychological organization of subject-matter. It is an arrangement of the parts of a structure in the *order of their degree* of appeal to the experiences and interests of the child.

Interrelation of Logical and Psychological Organization. — It may be argued, since in the last analysis the child's experiences are to determine in a measure the order of

presenting the topics in a selection, that it is useless to organize subject-matter logically. There would be no need of a logical organization of subject-matter if the purpose of teaching were merely to interest children. Fortunately there is a greater responsibility than this. Children should leave the school with some very definite ability to interpret the thoughts and feelings of others. But interpretative ability means capacity to analyze structures which convey thought. It means power to organize logically.

The *purpose* of the creator will not be understood until his *creation* is understood. If the logical organization has been mastered by the teacher he will at the proper moment find it easy to reveal to his pupils the relative importance of the parts to the unifying idea. Such an organization will provide a proper emphasis of the topics, insure an adequate summary, and ultimately will expose the idea embodied in the structure.

Chronological Organization. — A chronological organization of subject-matter is often mistaken for a logical organization. The ease with which this organization is determined in many subjects accounts for its general use. It is easy to follow either the *time order or the book order of events* in literature, history, and many other subjects. There is but a very slight causal relation in such an order, consequently the "specific intrinsic" function of a structure is quite likely not to be exposed by such an analysis. Teachers of force and vigor will break through the shell of this time-honored treatment of subject-matter and lay bare the vital relations of the parts involved and set them forth in a logical arrangement before attempting to teach such subject-matter.

CHAPTER V

THE CHILD FACTOR IN METHOD

"Progress, Man's distinctive mark alone,
Not God's and not the beasts': God is, they are;
Man partly is, and wholly hopes to be."

THAT man has made "progress," evolved from lower forms of animal life, cannot be denied; that progress is "man's distinctive mark alone" is only partially true. Other animals have encountered the same rigorous climate, endured like variations in food and shelter, struggled with relentless diseases and fought encroaching enemies from without and within their natural groups, and consequently have experienced physical improvement and developed greater cunning. Nevertheless, they have been unable to determine their own progress or consciously modify their own social relations. In the whole animal kingdom, man alone has consciously learned to understand and to control his environment, and finally to transform it to meet his needs.

Human Nature Accounted for. — Before the *Origin of Species* by Darwin, the *special creation* theory of Biblical literature was assumed to be true. To "form man of the dust of the ground and breathe into his nostrils the breath of life" in a single act, removed from man the responsibility of accounting for his own superiority. It was not strange, therefore, that the theory of evolution, now so universally

accepted by biologists, served as a powerful stimulus to those interested in the causal factors of structural and functional changes. Out of this unified effort on the part of scientists, there have developed two distinct theories relative to the origin of species.

Two Distinct Theories of Evolution

One of these theories justifies differences in organic life on the assumption that organisms adjust themselves to a changing environment and then transmit the characteristics thus acquired. The other theory accounts for these differences on the principle of congenital variation. By this principle changed environmental conditions are given as cause of parental variation. Out of the multitude of offspring, those best adapted to the environment survive. It is argued that those thus fitted by chance to survive, under the changed conditions, and in accord with the law of variation, will give birth to offspring, many of whom will have characteristics better adapted to the environment than are those of their parents. Those thus favored by chance when the life struggle becomes intense will survive while their less favored relatives will be forced to succumb in the unequal competition. Thus by slight variations in succeeding generations, species are selected that are quite different in structural and functional characteristics from their remote ancestors.

Transmission of Acquired Characteristics. — The "transmission of acquired characteristics," the foundation rock upon which the first of these theories rests, though in ill repute to-day, has been held valid by some of the greatest scientists of the last century. Darwin's theory of pan-

genesis, which was an attempt to explain the theory of acquired characteristics, accounted for differences on the assumption that the organic adjustment of an individual to a changing environment is registered in gemmules cast off by the various cells of the organism. He held that these gemmules are finally caught up by the reproductive cells and thus become a determining factor in the new organism. La Marck and Spencer held firmly to this view also, while Galton, though accepting it at first, afterward discredited it. The number of others who have held this view is legion, although rapidly decreasing.

It were fortunate for a moral and industrious people if such a theory were true. It would insure permanency to every moral victory, every worthy thought, and every intense emotion. It would make "Excelsior" a biological as well as a social heirloom. Habits, both mental and physical, developed through efficient teaching, would become accumulative through transmission, thus making it possible for the race, by its own organized effort, and through the instrumentality of the school, to leave "each low-vaulted past," in a structural sense, for one "nobler than the last." On the other hand, such a law would tend to accentuate individual vices engendered by abnormal conditions in an environment, and thus give reality to the theory that the acquired sins of the father are visited upon the children even to the third and fourth generation.

Congenital Variation and Selection. — The second theory, which accounts for organic change on the basis of congenital variation alone, was first advocated by Weismann.[1] He conceived the notion that the cells of a developing embryo very early in its development migrate to that part of the

[1] *The Germ Plasm*, A. Weismann. New York, 1893. Scribner's.

organism in which they subsequently function. The reproductive cells so far as functional influences are concerned are thereby soon independent of other cells. This independence of the reproductive cells in location and function precludes the theory of pangenesis or other theories of the transfer of post-natal changes. It limits the possible capacity of an individual to the native rather than to the acquired characteristics of his ancestry.

Since hereditary variation is the only means of biological progress and since natural selection is barred by civilized practices, it is evident that a deliberate selection of ancestors whose dominant characteristics are needed is the only effective way of securing rapid and permanent advance in physical potentiality. Modern methods of breeding which have developed the splendid horses, cattle, hogs, fowls, and plants of recent years are based upon the principle that qualities may be accentuated by selecting ancestors in whom the qualities desired have become pronounced through hereditary variation.

Galton maintained that "there is nothing either in the history of domestic animals or in that of evolution to make us doubt that a race of sane men may be formed, who shall be as much superior mentally and morally to the modern European, as the modern European is to the lowest of the Negro races," by the process of selection. He says: "Individual departures from this high average level in an upward direction would afford an adequate supply of a degree of ability that is exceedingly rare now, and is much wanted." [1]

Though recent success in the improvement of domestic animals and plants substantiates this view, the religious

[1] *Hereditary Genius*, Galton. Prefatory Chapter, 1892 Edition.

and ethical status of our time makes the application of such methods to the human family repulsive and therefore unattainable.

Advancement through Accumulated Experiences. — By barring the deliberate selection of ancestors, this law of heredity, so generally accepted to-day, seems to strike at the very heart of human progress. It brings us face to face with the question: How can the race increase its mental, moral, and vocational capacity if each generation begins on as low level as its predecessor? If the transmission of superior nerve fiber through selection were the only means of improving the race, there could be little hope for a moral and religious people to advance. Fortunately there are other agencies whereby the race can get relief.

That effort is not accumulative is only true biologically, certainly in no other sense. Viewed from a biological standpoint the present generation has inherited none of the power and skill acquired by the preceding generation. In this particular the race has gained nothing by its long experience. Barring this, it is the "heir of all the ages." Though the present generation has not inherited, in modified nerve tissue, the particular literary capacity acquired by Shakespeare and Browning, it has inherited "Hamlet" and "Macbeth," "Pippa Passes" and "Rabbi Ben Ezra"; and though it has not inherited the skill acquired by Turner and Landseer, it has inherited the "Mouth of the Seine" and the "Fighting Téméraire," "Shoeing the Bay Mare" and the "Monarch of the Glen." Though, probably, we are no better off biologically than our fathers were, we are certainly heirs of the social accumulations of all times. These are the heritage of a civilized people, and the school is its agency for transmitting them.

The teaching process is the link that unites the undeveloped child, on the one hand, with his social heritage on the other. The permanency and completeness of that union depend largely upon the efficiency of the teaching process. The phases of this social heritage which should be presented to the child in order to make him "socially efficient" are given consideration elsewhere. The phases of child activity involved in utilizing the social heritage and the methods which should be employed in arousing these various phases of activity will be considered here.

The Reactive Attitude of the Child

The problem which most concerns the educational practitioner is not how the child evolved, but what he is now in potential consciousness and habit, and what he is capable of being in terms of conduct. It is evident, at the outset, that a definite knowledge of the child's mental responsiveness and instinctive tendencies has a twofold bearing upon teaching. *First*, it determines the character of the subject-matter that should be presented. *Secondly*, it determines the character of the response that should be stimulated.

In educational circles we boast much nowadays of our progress in applied psychology, of our knowledge of scientific principles, of the science of teaching. Those who talk loudest of our educational sanctification often seem most oblivious of the fact that many who teach are little conscious of the effect that *present* knowledge, habits, ideals, and prejudices will have upon *future* needs, interests, and responsibilities. Many of our professionally trained teachers are giving more weight to the amount of subject-matter covered in a prescribed period than they are to the

interests engendered and the mental attitude established by such subject-matter; to the number of days that the child attends school than to the number of minutes he is actually striving to solve some problem for which he has a felt need; to glibness of response than to serious purpose and effort.

The blaséness of many students of secondary and college standing is due to the fact that no great interests were inculcated and no fundamental habits formed in them in the elementary school. The miserable marking of time, handing in papers that are seldom examined, dismissing problems that are of vital concern to the child, pottering with needless details when bright and willing children are hungering for problems that smack with worth-whileness, are responsible for the chronic indifference manifested in many of our schools. Indeed, blaséness is nurtured in the elementary school wherever teachers are more concerned with *form* than *results;* with the manipulation of subject-matter than with the child's life interests.

To teach effectively one must make a direct appeal through reason to the pupil's aims and purposes, through native satisfaction to his reflexes and instincts. The latter appeal usually will engender a sufficient emotional momentum to insure persistent effort; the former appeal will conserve energy and establish a self-respect essential to individual freedom. Judging from common schoolroom practices, no clear distinction is made between *reasoning* or *purposive* thinking and *spontaneous* thinking. Were they the same, the dry-goods-box philosophers who frequent the village grocery would have long since been notorious for their contributions to the sum total of human thought.

Two Types of Thinking

In order to evaluate teaching in subjective terms it is necessary at the outset to distinguish sharply between *spontaneous thinking* and *purposive thinking* or reasoning, and to point out the relative difficulty of stimulating each; not that one is more valuable than the other (both are indispensable) but because the quality of teaching required in the one case is more difficult and more valuable than in the other and consequently denotes a finer teaching service.

Spontaneous Thinking. — Spontaneous thinking, which constitutes the major part of one's daily consciousness, is the mere flow of "trains of images" in the stream of consciousness in the occurring order of previous experiences, or in a fanciful order. The order of these "trains of images" depends upon the psychic law of "successive associations." Images may be associated by contiguity, similarity, or by cause and effect. The nature of the association depends upon the juxtaposition which prevailed the last time. Related images are likely to reappear, dragging their former associates into consciousness with them. This law of association is accounted for physiologically on the assumption that cortical centers in the brain, having once created successive images, are susceptible to a like reaction owing to the fact that the path joining the centers is made more permeable by the impulses which traverse it.

Since repetition of the successive functioning of associated centers increases the permeability of the pathways connecting them, repetition is an important factor in this kind of thinking. Moreover, the character of the association formed determines the efficiency of the thinking.

The fundamentals in the various branches of knowledge are basic to higher thinking and should, therefore, be subject to immediate recall when needed. Consequently much of the child's early school life should be spent in processes of this character. The long drill that is necessary to fix tables in arithmetic, word symbols in reading, locative geography, and time and place relations in history, is evidence of the teacher's sense of responsibility in this connection. Since the value of these facts depends upon the accuracy of their associations, and since accuracy and speed depend upon the efficiency of the method employed, it follows that the teacher's method in fixing such associations should be based upon a knowledge of the principles of habit formation. (These principles are given in another chapter.)

Though such "trains of images" are absolutely essential to mental life and though they are the foundation rock upon which purposive thinking rests, we must not permit ourselves to be deceived by the delusion that such a state of consciousness is "purposive thinking" of any serious sort. Since such a delusion is manifest in many schoolroom practices which are justified by the theory that they stimulate a maximum amount of reasoning power, we shall consider the matter more in detail.

Example of a Common Delusion. — Modern laboratory work presents concrete evidence of this very common delusion. The impression pretty generally prevails that this work is rich in purposive thinking. What are the facts? The following is a brief of a recitation observed by the writer: The teacher purposed to present the subject of "air pressure" in problematic form to a class of secondary pupils. When the class was seated the teacher disclosed

the problem in mind. After watching a little while for some effect of the disclosure, which did not appear, he aroused certain ideas in the pupils' general stock of notions which were needed in the solution of the problem at hand.

After looking at the hollow glass tube in the teacher's hand and some mercury on the table, both of which suggested a recent experiment which the class had observed, a member of the class suggested that the tube be filled with mercury. The teacher smiled while he visualized the "wonderful" feat of reasoning that had been accomplished. As the mercury in the inverted tube came to rest, the teacher, moving a meter stick with his left hand, asked, "What next?" The stick easily suggested measure, and the single column of mercury suggested what to measure. A student stated the association and the teacher smiled again. "What next?" An observing pupil saw the balances that had been brought in for the purpose. These naturally suggested weight and the column of mercury suggested *weigh mercury*. He ventured this information and the recitation continued. Through suggestive questions and other suggestive stimuli the stream of consciousness of this class in science was pulled out (or shall I say in?) like a long ribbon until the spindle (conclusion) was finally exposed, and the class was given credit for causal thinking.

Purposive Thinking. — Before we can evaluate this very common practice in school work, it is necessary to consider further just what constitutes purposive thinking or reasoning. In the language of Professor Angell, "reasoning . . . is . . . thinking carried on in the interest of some plan which we wish to execute, some *problem which we wish to*

solve, some difficulty which we wish to surmount."[1] Since the foundation of reasoning is a "*wish to execute — to solve — to surmount*," it is evident that the *end* to be attained should have a *felt value* to the reasoner, else there is little impetus for him to search his stock of ideas and standards for means of attaining the end set up. Moreover, reasoning to be valuable to the pupil should be self-directed. The *felt need* from within and not the objective stimulation by the teacher should be the impetus that leads him to select from his stock of ideas those that are most appropriate for realizing the end sought. Furthermore, these ideas should suggest the *habit tool* that is to be employed in arriving at the end or final conclusion.

Examination of the solution of the above problem in physics reveals the fact that the "end" sought was not one that had a genuine "felt need" to the pupils, since it did not arise out of their direct experiences. Secondly, the pupils were not responsible for the choice of the *special* ideas that were selected from their stock of experiences. These "bobbed up" in response to the remarks of the teacher. Thirdly, the order of these ideas, the "habit tool," was suggested by the teacher. It would not be true to fact, nor fair to the teacher, to say that the class in this particular was "guilty" of no reasoning. Doubtless the mere suggestion of an end to be attained stimulated some of the pupils to assume a responsibility for its attainment. That the remarks of the teacher caused some of the pupils to search seriously for ideas that gave the end desired and that these ideas sometimes stimulated a search for a method of applying them, is quite probable. In the main, however,

[1] *Psychology*, Angell. "Judgment and the Elements of Reasoning."

thinking of this type consists of "trains of images" linked together by similarity. Exercises of this character should be evaluated in terms of information secured rather than in terms of reasoning.

Factors Involved in Purposive Reasoning. — We should keep constantly in mind that the prerequisite of wholesome reasoning is of a fourfold character. First, there must be a problem; second, there must be a stock of ideas sufficient to meet the demands of the problem; third, the problem must have a felt need for him who is to do the reasoning, else he will lapse into a state of indifference; fourth, certain efficient ways of arranging ideas (mental habits) in order that the desired end may be adequately secured should become habitual with the child. The neglect of any one of these elements will seriously handicap the reasoner. The felt need may be enriched and intensified by an appeal to the life interests and to the instincts; a rich stock of ideas is acquired by a constant widening of one's experience in the field of knowledge; and mental habits that are essential to effective reasoning are established through drill.

The Problem. — In practical life one doesn't set aside certain periods of the day or week for the purpose of exercising his reasoning powers. In fact, he exercises these powers but little except when he is confronted with a problem of vital concern to him, either practical or philosophical in character. In like manner school children think most naturally and most effectively when confronted with problems which appeal to them.

The responsibility of raising problems, progressive in character and related closely to their experiences and interests, is therefore the most serious one which text writers

and teachers have to face. Success in either profession is proportioned to the skill and insight employed in setting and solving problems.

The Project a Form of the Problem. — The stress that has been given to this form of the problem in some educational circles has made almost a fetish of it for the uninitiated. In order that one may estimate properly the relative merit of this form of the problem he should understand it thoroughly.

Examples of the Project. — The problem of furnishing a "play house" in the first grade is a familiar example of the project. A small "model house" is usually supplied and the children are required to furnish it appropriately. This imposes upon the children the responsibility of papering the walls, weaving rugs, making paper furniture, preparing curtains and other articles needed to furnish the house properly.

The problem of making a flour map of the school district in which the school is located is a suitable project for a fourth grade in geography. The solution of this problem involves a knowledge of the streams, roads, homes, and towns in the township and of their interrelation to each other. Moreover, it requires that a scale be used in the construction of the map, which represents the unit of measure employed in measuring the township.

The problem of determining the necessary cost of building a barn that is being erected in the neighborhood is a suitable project for an eighth-grade class. To accomplish this, the cost of excavating for the walls, the cost of the materials composing the walls, the amount and cost of the lumber and other materials, and the cost of the labor are required.

Through the solution of such problems the well-trained teachers will expect their children to acquire certain definite knowledge, skills, ideals, and tastes that are needed for further successful work in the schoolroom and that are needed to meet the problems of after-school days.

The Project Defined. — The project is a complex problem, the solution of which involves the solving of several subsidiary problems whose solutions are needed in mastering the complex problem or project. It is a valuable teaching device when the teacher deliberately and purposely employs it for the specific purpose of stimulating certain desired controls such as specific knowledge, ideals, skills, and tastes.

Value of the Project. — The project is a valuable teaching device in that it lays stress upon *specific* values in functional sequence and thus arouses a *specific motive for the subsidiary problems involved.* When used effectively it develops a *subject-matter bent* in the pupil and makes him aware that subject-matter rightly considered is a *means* to an end and not an *end* in itself. The fundamental problems of practical life are projects and to the extent that the school succeeds in making its problems *life-like,* it will adopt the project method of teaching.

Basic Experience. — Success in the first factor of purposive thinking is conditioned by the experience of him who is to solve the problems. This second factor has been a source of much disagreement as well as much failure among teachers. A problem is subjective and not objective. It is conditioned by one's sense of values and by the experiences which he employs in an endeavor to attain those values. A problem to be real to any one must be adapted to these two psychic aspects of his nature.

This factor in problem-setting limits success in this field to those who understand and appreciate the progressive unfolding of children's minds and the consequent experiences and values which accompany this unfoldment.

A Felt Need. — A third prerequisite to purposive thinking, and one inseparable from experience, as the above discussion indicates, is a consciousness of a felt need for the value to be attained through the solution of the problem in question. Perhaps no other factor of purposive thinking has been so instrumental in influencing methods of presenting subject-matter as this one.

Order of Essential Factors in Causal Thinking. — The order of the essential elements in causal thinking is so closely related to a "felt need" that some consideration should be given to two common practices of teaching. The so-called "natural" order of presenting subject-matter is nicely illustrated by the common method of teaching geography. Ordinarily in a recitation upon Italy, the class is required to give its location relative to that of adjoining states, to give its physical and natural boundaries, its physical features, its products, its industries, its people, and its government, in the order followed here. Each association is largely that of contiguity, involving little of the association of cause and effect.

From Effect to Cause. — A different procedure and one more likely to arouse a felt need consists in gathering data on the kind and number of products that the local community receives from Italy. It is natural to ask in this case, why? The answer will lead to the cause — the occupations of the Italian people. An answer to the question as to why they are so occupied will lead to an understanding of climatic conditions, raw materials, commercial relations

with other countries, intellectual status, form of government, and the relative influence of Italy as a nation. This method begins with the effect which, from the very nature of thinking, the mind tends to associate with cause.

In actual life one never goes about searching for cause until the effect stares him in the face. One seldom thinks of an insect destroyer until insects infest his plants, of laws to punish criminals until crimes have been committed, of antitoxin until certain diseases become dangerous, of glasses until the eyes begin to fail. In practical life one begins with a certain experience and then proceeds to account for it. He naturally proceeds from effect to cause. Racial progress is marked by the number of right solutions of this character. The need always arises when an effect presents itself. With this *felt need* comes motive of a genuine character. These needs are individual and are consequently fundamental to individual existence.

If a child is trained to associate effects with their appropriate causes, the presentation of the one will naturally arouse an intellectual and an emotional attitude for the other. One who has never worn buttons on his coat is little concerned if a new garment has no means of fastening the sides. On the other hand, a buttonless coat will arouse an intense interest in him who has habitually associated buttons in their natural relation. Related experiences are undoubtedly basic factors of interest and of causal thinking as well. The recurrence of one member of a previous association is likely to engender an interest in its associate member. Moreover, it tends to stimulate anxiety in the *cause* of the disassociation.

Instinctive Element in Need. — Felt needs also grow out of certain racial habits. I refer here to the social instincts.

Until recently we have underestimated the value of these social instincts in securing motive for work. The old slogan was "work for the love of the work." It ignored the fact that man survived because of certain predominating tendencies to fight, to strut, to accumulate, to love, and to hate. The modified form of these old instincts gives rise to many of the motives that stir men to untiring effort. Why do men who are worth millions of dollars strive for more wealth? Certainly not because wealth will add directly to their happiness or that of their friends. They do it largely from a desire to beat the other fellow, to dominate and control, both of which are modifications of the fighting and strutting instincts. The spirit of emulation is a great stimulant in the business world, on the race track, the playground, and on the athletic field. There is no legitimate reason why the work of the schoolroom should be exempted from such a stimulant.

Professionally trained teachers have relied too much upon the efficacy of the technique of the recitation for adequate motivation. Carefully organized subject-matter, well-directed questions, good assignments, and concrete materials are all essential means in the teaching process, but they are seldom sufficient. It is not enough to lead children to "*think through an assignment*," to "*acquire information*," and to "*reason*," though such practices are very desirable. Good teaching does this and more. It engenders the desire to accomplish something, to achieve, to win honorably. It lays the emotional foundation for permanent life interests. If "achievement" is the end of educational effort the teaching process should establish an emotional momentum that will ultimately insure this coveted goal. The effects of so much present-day method

seem to extend little beyond the classroom. This is largely due to the fact that more concern is given to *immediate* than to *mediated* interests.

By no means are all of the children that are subjected to modern methods dulled in the spirit of achievement. The leaders in the class, those to whom the majority of the class look for the final word, are saturated with it. These leaders win, not so much because of superior ability to reason, but because of the instinctive desire to win and thereby secure the approval of their fellows and their teacher. It was this spirit of emulation that gave the unusual zest to the old spelling school and debates, and to those games that have persisted down through the ages. It is reasonable to predict that many of the duller students are capable of accomplishing effective work if only the *desire to win* can be engendered in them.

Negative Incentives Retard Progress. — Strangely enough, observation of many of our schoolroom practices is sufficient to convince one that winning is often suppressed by practices that are intended to engender it. In order to improve the effort of children they are threatened with failure in grades, with being kept in after school, with corporal punishment, and finally with expulsion. With what results? Instead of increasing interest in the subject-matter, such practices cause the child to associate the displeasure arising from the punishment with the subject-matter over which the trouble arose. Each punishment thus tends to establish a stronger dislike for the subject and for the teacher who presents it, and consequently increases the need of more punishment.

It is pretty certain that if these retarded interests are to be revived, the negative appeals that have been in vogue

for so long must be abandoned. The appeal must be positive and directly to the child's interests, both native and acquired. The subject-matter must be related directly to those experiences that have a felt value for him. Once something worth while is accomplished it should receive social recognition.

Success a Positive Incentive. — "Nothing succeeds like success." Success is absolutely necessary for the establishment of a permanent interest in any subject. The child must be made to feel that he can and does succeed. Ordinarily teachers are anxious to approve by smile, or word, or grade, the success of those who do exceedingly well, while they reward but little the *improvement* of those who are relatively weak. Man is so constituted that he finds pleasure in recognized achievement, and displeasure in failure. The untrained child is more susceptible to these influences than is the adult. In actual life, man, through the sifting process, usually adjusts himself to the field of opportunity in such a way as to insure success.

Fortunately the school can be more flexible than are circumstances in real life. Its flexibility permits materials and methods to be adjusted to the capabilities and desires of the child and thereby insures his success. Success thus secured will create in him a feeling of worth and a sense of achievement that will drive him on to further effort. It must not be inferred that the work is to be made easy — far from it. No adult finds interest in winning a "baby" game. Neither do children develop life interests in the accomplishment of deeds that do not test their mettle. A strenuous test of mental fiber is imperative to zest for achievement.

Variation in Instinctive Responses. — Any practical use

of the instincts involves an understanding of their dominance in the life of the child. Curiously enough the instinctive dominance varies with the growth of the child. An instinct may hold the center of the arena, so to speak, at one stage of the child's development and be relatively submerged by a stronger instinct at another period. The hoarding or assembling instinct so pronounced in the pre-adolescent period is submerged, indeed almost negatived, by the social instincts of the adolescent. Again, the instinctive desire for the "myth" in early childhood is submerged later by the strong instinctive longing for the heroic story at the ages of ten to thirteen, and even later. Usually the hero in the adolescent period is one whose heroism is actuated by pure motives.

It is well for the teacher to know of these instinctive outcroppings that she may select subject-matter that will create a maximum amount of interest. This is no new philosophy. "Strike while the iron is hot" is a maxim the truth of which is as old as human experience. Such a philosophy is a protest against handing courses of study down from above. "Lights to Literature" and "Stepping Stones," chosen from an adult point of view, are likely to incite little interest in children. Chosen on the basis of the appeal they make to the child, they will be "lights" and "steps" that stimulate a felt need.

No sharp and fast lines can be laid down relative to the time and prominence of the marked interpretative stages of the child. Observation of children's activity in their unrestrained moments furnishes the best key to their interests. Suffice it to say that teaching becomes a fine art when the teacher is able to draw upon those materials which will stimulate in the child a maximum interest in the things

that directly equip him to meet best his obligation as a member of a highly organized group.

Habits of Reasoning. — This fourth factor in purposive thinking is overlooked by teachers who believe that power to reason is an accumulated potentiality that has resulted directly from reasoning. Once this habit of reasoning is acquired they believe it will function in any capacity. They fail to realize that an *accumulation of reasoning habits* is one essential factor in reasoning, and that *originality in reasoning depends upon the selection of the reasoning habit that is to be used* to realize the end desired. In order that a child may find the cost of six apples which sell at five cents each, it is imperative that he have the following reasoning habit. Since six things of equal value cost six times as much as one of the things, six apples at five cents each cost 6×5 cents or 30 cents. With such a mental habit he is equipped to find the cost of cows, horses, or lands, etc., when the number of units and the price per unit are stipulated. Teachers hesitate to fix such relations on the ground that the child does not grasp them in their entirety, or that they retard originality.

If the teacher waits to teach the notion of areas, solids, letters, and words until they are grasped in their entirety, it is probable that the child will be ignorant of the fundamental tools of thinking throughout life. Once the habit of rightly relating a part to the whole is fixed, the child is equipped with the tool for solving problems of this character. The so-called three cases of percentage are built upon three habits of relating a part to the whole. The exercises in mental arithmetic, in algebra, and in geometry are justified mainly because they furnish drill for the fixing of reasoning habits that are believed to function in other organized effort.

It cannot be denied that many of the school exercises are justifiable only in so far as they produce such habits. Granting this, it imposes upon the teacher the responsibility of determining the habit that any particular material is fitted to fix and of drawing upon this subject-matter until the result is obtained. It is very doubtful if any subject should be studied solely for this purpose.

Individual Difference. — Much of schoolroom practice is based upon the assumption that children are essentially alike. Seats of a uniform size for all children of a grade, a uniform course of study required of all, an absolutely minimum requirement for promotion, and like punishment for like offenses, are some earmarks of the prevailing practice, which reveal the common notion that children are alike.

Expert evidence is not wanting to prove that children have many traits in common. Neither is it needed to prove that children have marked individual traits. The former have been unduly emphasized in the past. The latter will receive more attention in the future.

Sense Differences. — Even under normal conditions of the special senses, there is a variation in sense appreciation. The probabilities are that a few children in a large school group are keenly eye-minded. When we realize that probably 20 to 40 per cent of the children in the grades have defective eyes and ears, the problem of proper individual care becomes decidedly serious.

We have known of a color-blind pupil reaching the seventh grade, and an extremely near-sighted pupil reaching the upper classes of the high school without these defects being known by any of their teachers.

Apparent stupidity, indifference, laziness, and oftentimes

insolence are frequently due to defective senses. One of the first duties of the teacher is to determine the status of the eyes and ears of his children. An equally important duty is to make adequate provision for the correction of these defects. Tonsils, adenoids, and teeth, though not affecting the immediate work of the classroom to the extent that defective eyes and ears do, undermine the child's health, lower his vitality, and ultimately reduce his desire and capacity for work. Proper care of the teeth alone furnishes a problem sufficiently large to require the vigilance of all the altruistic forces of any community. The potential health conditions of children in most communities are an ignoble monument of monstrous proportions to the ignorance, indecision, and irresponsibility of the group consciousness in these communities. Teachers must see to it that a similar monument is not erected to the memory of the next generation.

Instinctive Differences. — Other deep-seated differences in children will not be overlooked by wide-awake teachers. Shyness, self-consciousness, impulsiveness, self-confidence, and stubbornness prevent a spiritual unity. The negatively reactive and positively reactive children are the source of many perplexing situations in the schoolroom.

There is no "cure-all" for these conditions which may be secured by a six-weeks attendance at a summer normal school. Each condition requires a specific remedy. A broad sympathy, an interest in educational psychology, and a spirit of research and experimentation are some essential factors required in the solution of this problem. The negatively reactive child needs a different set of stimuli from the positively reactive child, and conversely. The latter are frequently the teacher's pets while the former have

been a source of no little annoyance to those teachers who lack interest in individual differences.

In the last analysis the key to teaching is the *reactive attitude* of the child. A teacher's consciousness of this factor may not always be explicit. It is his duty to make it as nearly so as contact, sympathy, and sane experimentation with children and a familiarity with the literature on child psychology will warrant.

CHAPTER VI

TEACHING BASED UPON WAYS OF LEARNING

Meaning of Teaching. — Teaching consists in the conscious direction of stimuli to the end that the teacher's aim or purpose is realized in terms of desired pupil controls. Controls thus purposed by the teacher may be obtained through the direct stimulation of conscious or unconscious imitation, inductive or deductive thinking, one or all combined. It matters little whether the results be higher ideals, worthy prejudices, better habits, an increased number of facts, or richer generalizations, the conscious direction of the stimuli that results in the change is teaching. He who consciously directs such stimuli is a teacher.

Relative Value of Means and Ends. — Means and ends as factors in the teaching process are inseparable. Remove the latter, and an incoherent and aimless reaction results; remove the former, and dreaming and sentimentality prevail. Preaching and teaching are distinct in that the former lays more stress upon *desirable ends* of attainment, while the latter emphasizes the *goal* to be secured and the *means* by which it is to be secured. From the standpoint of method, means is decidedly the more important factor. There are many teachers who know "what were good to be done," to one who is efficient in

choosing and directing the appropriate means in its realization.

In the last analysis teaching should be judged in terms of behavior. Changes in the child's ways of *feeling*, *thinking*, and *acting* are not necessarily the results of educational endeavor, since there are many environmental influences other than teaching which affect the child. It is reasonable to suppose, however, that the quality of one's teaching varies directly as the worthiness of the feelings, thoughts, and acts of the pupil varies during his school life. If this be true it is fundamental, first, that the teacher know the status of the child's controls; secondly, that he determine the changes in these controls which his teaching should stimulate; and thirdly, that he direct the *natural processes* by which these controls are acquired. The first two of these items are to be given consideration elsewhere. The last will be considered here.

Methods of Learning

Imitation a Method of Acquiring Control. — One may have the opinion that free trade is the best revenue measure possible for America. This opinion may have been formed from reading such an assertion of some political economist, from hearing a political speech, or from listening to the declarations of would-be philosophers. In each case it is an imitated judgment if it is accepted as whole cloth on faith. One's notions of the possessions of nations, the population of cities, the severity of climates, the relative size of oceans and rivers, the worthiness of rulers, the self-sacrifice of leaders, are in the main imitated judgments.

Conventionality — the essential factor of social continuity, coöperation, and a sympathetic understanding — is the off-

spring of imitation. We go in flocks and herds. We change our gowns and our houses, our religion and our politics, our manners and our policies, in conformity with those we observe. The commonness of this sort of judgment-forming makes it easy for impostors to impose upon the public. It gives the press and platform a tremendous influence in molding the affairs of nations. Along with the opportunity and influence comes a great responsibility. It is the business of the public school to engender in the lives of those with whom it comes in contact a strong tendency to evaluate in terms of experience the acts and opinions of others. The misdirected and awful conflict recently concluded in Europe is evidence of the unpreparedness of the masses to act independently of the narrow and biased opinions of leaders who are influenced by their own personal desires.

Progress depends upon one's accepting pretty generally the opinions of others. Life is too short for us to discover, as individuals, what the race has taken ages to accomplish and understand. Knowledge must be passed along to a large extent. One assumes an enormous responsibility who is charged with its transmission. The school should see to it that the information given out within its walls be the most authentic and desirable obtainable.

The process of judgment-forming through imitation has a method side as well as a subject-matter side. Facts in geography, history, the natural sciences — in all subjects to a greater or less extent — must be taught. There is little reason involved. The intrinsic value of these facts is seldom realized. An essential problem for the school is to motivate these fundamental facts.

It is in the teaching of these facts especially that the

teacher needs to draw upon the instinctive tendencies of the child. The spirit of emulation and the love of approbation should be appealed to. This must be done consistently and with sincerity. Cheap methods and insincerity should be avoided. Approbation in the hands of teachers is often so cheap that even children feel it, though they may not be sufficiently mature to discern the peculiar quality of its cheapness. No other device reveals so conclusively a teacher's lack of devotion to her work.

Reasoning a Method of Control. — Reasoning is the conscious process by which one controls a situation, when his habits fail to do so. This control may be attained by the discovery of principles — inductively; or it may be attained by comparing an individual situation with a general principle — deductively. In this connection Dr. Dewey says: "This double movement *to* and *from* a meaning may occur, however, in a casual uncritical way, or in a cautious and regulated manner. To think means in any case to bridge a gap in experience, to bind together facts or deeds otherwise isolated. But we may make only a hurried jump from one consideration to another, allowing our aversion to mental disquietude to override the gaps; or we may insist upon noting the road traveled in making connections. We may, in short, accept readily any suggestion that seems plausible; or we may hunt out additional factors, new difficulties, to see whether the suggested conclusion really ends the matter. The latter method involves a definite formulation of the connecting links; the statement of a principle, or in logical phrase, the use of a universal. If we thus formulate the whole situation, the original data are transformed into premises

of reasoning. The final belief is a logical or rational conclusion, not a mere de-facto termination." [1]

If teaching is to determine the character of this "movement *to* and *from* a meaning" so it will occur in a "cautious and regulated manner," instead of in "a casual uncritical way," it is evident that the teacher must understand the *factors* involved, their *order* in the process, and an *effective means* of properly stimulating them. A "cautious and regulated manner" means a natural manner subjected to the restraint of desirable habits.

Just as analysis is the first step in all thinking so it is the first step in an effort to secure "cautious and regulated" reasoning. When a "break in control" or a "gap in experience" occurs, habit has failed to meet the emergency, and the processes known as reasoning arise to "bridge the gap." The break is manifested as a "felt difficulty," a feeling of an obstacle to surmount without a ready means of surmounting it. Just as one tries to determine the character and location of a sudden strange sound, so in any felt difficulty, his first endeavor is to "get a line" on the situation to be overcome. One examines the details or data that appear. Through the process of comparison possible solutions of the situation are suggested as tentative problems. These tentative problems, or hypotheses, are each in turn checked up hastily in the light of apparent data, and one of the many problems is decided upon as being the most feasible. With this tentative problem decided upon, new data are assembled for its solution.

An illustration will suffice to distinguish the main line of procedure in such a thought process. One is returning from town after a heavy rain. After crossing several

[1] *How We Think*, Dewey. "The Double Movement of Reflection."

bridges he comes to a stream where the bridge is washed away. There is a "gap in experience." A "feeling of difficulty" at once arises. After the width and depth of the stream as well as the character of its banks and the swiftness of its current have been observed, there follows naturally the hypothesis: Can one drive across the stream? Then in detail all the environmental conditions that influence such an act are checked up in the light of this tentative hypothesis. Observation of the qualities of the team, the character of the land, the soft soil in the bed of the stream, and the steepness of the opposite bank follow in response to this hypothesis. In the light of these data the first hypothesis is abandoned. A second hypothesis, involving turning about and driving in a roundabout way up the stream for several miles to a bridge, is advanced. The character of the load, the road, the long distance, the possibility of the bridge being washed away, the late hour of arriving home, all cause an abandonment of the second tentative hypothesis. A third hypothesis involving the unhitching of the horses, riding one, and leading the other across the stream comes in the foreground. The driver recalls similar successes in this connection. He contemplates the early return to his home and the probability that the contents of the wagon will not be injured before the stream subsides sufficiently for the wagon to be taken across it. This hypothesis is checked up satisfactorily in terms of experience and desirable values, and immediately the act is executed. The driver's early arrival at his home verifies the trustworthiness of the third hypothesis.

It is quite evident that throughout the entire solution of the major problem inductive and deductive thinking are

determining factors. The early examination of the situation — comparing the banks, stream, and the turbulency of the current with similar data of experience — and the tentative suggestion of driving across the stream are all inductive activities. The further testing out of this hypothesis in the light of more varied and detailed experience, resulting in the rejection of the scheme, is deductive in character. The projecting of other hypotheses and their rejection or acceptance deal successively with like thought processes.

This illustration may suggest the highly complicated and overlapping processes of inductive and deductive thinking. If, however, one should refuse to note the character of a closely woven fabric simply because of the complexity of the weave, or refuse to test the character of a compound because of the intricacy of the interrelation of its elements, he would be considered amateurish, indeed, in the fields of textiles and chemistry.

The science of chemistry depends upon the power to analyze, isolate, examine, and reunite the so-called elements into compounds. The science of teaching is based upon the belief that mental processes may be analyzed and their conditions and remedial means diagnosed and prescribed in such a way as to secure definite results. With this in mind we shall consider the processes of induction and deduction separately just as we would consider positive and negative electricity separately though we well know that their interdependence is indispensable.

Two Types of Reasoning — I. Induction

A study of the history of social and industrial evolution reveals a pronounced racial tendency towards in-

duction. Improvement in methods of war and of travel upon land and sea, in weapons of defense, in the household arts and modes of dress, in methods of agriculture and engineering, in the treatment of diseases, and in the application of natural laws reveals the race's continual progress from particular experiences to generalizations. Each generation rises to higher levels by the generalizations which grow out of the comparison of its own experiences with those of preceding generations, made possible by the accumulation of knowledge and the other acquired controls.

Inductive Factors. — Individual growth reveals modes of progress. Experiences with insects, vertebrates, climatic conditions, and seasonal changes involve *contacts*, *percepts*, and certain *generalizations*. In fact everything known of racial progress and of individual development leads to the opinion that the mastery of mind over matter in its first stages has proceeded from contact to percept and from percept to concept. Since every child is the product of racial evolution, there is an abundance of theory to convince one that the *order of his mental processes in developing intellectual control* is in harmony with the *order of the mental processes of the race in its development of intellectual control.*

Direct Perception. — Since contact is the initial step in control, it is evident that its character will materially affect the character of the control. One's presence in an environment does not by any means indicate his contact with it. Many a farmer's son goes to the university before he understands the flowers which grow all about his home, and the life history of the house fly and mosquito which have pestered him from childhood. Contact means

much more than mere physical association. It means *observing things in response to an instinctive appeal or in response to life interests.* A boy is in contact with those parts of his environment which stimulate his instincts or arouse related experiences.

He is in contact with the fly when he is conscious of its injury to man, and when, in the light of that consciousness, he examines it and determines its life history for the purpose of destroying it.

Adequate contact is only attainable through the solution of problems. The old epigram that you can lead a horse to the water but you can't make him drink is analogous to the one that seeing is not understanding. Nature-study method was first based upon the theory that all that is necessary to an understanding of nature is an opportunity to be present with it. Early nature-study was largely sentimental because it lacked the *problematic character* of recent study in that subject. Observation lessons, comments upon the characteristics of birds, and the more conspicuous fauna and flora seemed to be the main method of attack.

Like other subjects, nature-study has been brought "down to earth." Definite problems are set in order to force the child to perceive adequately the things of his environment. Where does the fly live in its various stages of development? What does the robin feed its young? What is the chief food of the toad? Where does the tree come from? — are problems that force the child to observe these animals and plants carefully as well as to organize his knowledge effectively. The *setting of worthy problems* is the most effective way to secure adequate sense percepts.

Indirect Perception. — Similar to the sense percept we

have an image, or an individual notion, removed from sense contact. The toys of one's childhood, Niagara Falls, New York Harbor, or the Soldiers and Sailors Monument, may all be individual notions obtained by sense contact long since withdrawn. Their recall is conditioned by memory. The characters of fiction have all the earmarks of sensed individuals, yet they have never been sensed. They are constructed from the elements of experience. Territories and governments in geography, campaigns in history, narrations and descriptions in literature, — in fact most of our material, the so-called subject-matter, deals almost entirely with images removed from contact. A vital problem for the teacher is, How can these images be rounded out and made true? Again the *problem is effective* but not sufficient.

Concrete materials are also essential. They are the warp and woof of constructed images. Maps, charts, illustrations, drawings, constructive work, modeling, cutting, measuring, and dramatization, all serve to stimulate definite outlines of these images. Much of our teaching results merely in the short-circuiting of oral and written words. In the language of Hamlet, it consists in "words, words, words." To give content to these words means to stimulate imagery. But adequate imagery can only be secured through a free use of sense materials. The so-called "born teacher" always draws upon these sense materials in full measure in rounding out direct images.

As McMurry has pointed out,[1] individual notions in themselves are of little value. To one so limited in his mental growth the world would appear as one heterogeneous mass, "a big blooming confusion," a wilderness

[1] *The Method of the Recitation*, McMurry. The Macmillan Co.

of things. The most significant factor in induction is therefore the process of changing chaos into cosmos, disorder into order, and of grouping individuals into classes — the discovery of the *common and essential characteristics* in the world of objects.

Comparison. — Since comparison, which is a factor in this process, is so frequently employed inadequately by inexperienced teachers it deserves a fuller consideration than the treatment here allows. Hence a special chapter is set aside for its treatment.

Generalization and Definition. — As the essential elements of a compound are disassociated and recombined by the process of electrolysis, so the essential characteristics of a group of individuals are disassociated and recombined into a new whole — a generalization — which, like the Irishman's flea, is difficult of location. When one tries to image a generalization the consciousness flits back to one of the many individuals with which it has "synthetic connections." Its close relation to individuals makes a definition of a general notion the most difficult process of the classroom.

Most persons know baskets from the individuals of all other classes of objects, but who is ready to attempt a *definition* of a basket? It would certainly be absurd to attempt to define a basket before one becomes familiar with all sorts of baskets in use. Each person is content with his notion of basket without attempting to define it.

The moment one crosses the threshold of the schoolroom he is apt to forget his experience with baskets and like experiences. To begin to introduce the child to *generalizations* by having him *describe* a class of things is to engage in a peculiar mockery. Occasionally some one desires to introduce nouns, punctuation marks, spheres,

continents, rectangles, cubes, and many other things in this way. All such should think of their experience with baskets, and occasionally try to form a definition which will *include* all baskets and *exclude* the individuals of all other classes of objects.

Formation of Definition

It must be borne in mind that comparison is as essential to the formation of a *definition* as it is to the formation of a *generalization*. Consequently the formation of definitions can best be perfected by permitting the pupils to compare their own definitions and later, as McMurry has pointed out, to compare their own with that of the teacher, and still later with the one given in the book. Such a comparison should enrich the definitions of the individual members of the class, and also develop a self-respect which seldom occurs when definitions are committed to memory.

Function of Definition. — Definition has an educational advantage in that it forces and intensifies comparison. When a child sees that his definition is different from those of the others, he immediately begins to compare individuals for the purpose of laying hold of the essential characteristics of the class. Such an examination deepens perception and purifies the generalization.

Application of the Generalization

Though application is deductive in form it should be borne in mind that in the teaching process it has an *inductive purpose* or *function*. That is, we proceed to test our generalization not, if you please, for the purpose of understanding the individual, but for the express purpose

of finding out if we have discovered the right principle. One may experiment with a balanced ration for chickens for the purpose of increasing the yield of eggs. His first experiments lead him to a tentative principle. He tries it out on other breeds of chickens and finds that he must modify it somewhat. He further experiments with the modified ration until the results are relatively stable and consequently satisfactory. He has established a principle. His *trials* are to insure the trustworthiness of his generalization. Such trials are *inductive in purpose.*

Later on in the season he leaves for his vacation. On his return he notes that the egg yield is decidedly low. He at once concludes that the chickens are not being fed a balanced ration. This problem is solved by the mere application of a principle to an individual case. This process is *deductive in purpose.*

In all search for principles there is of necessity a need of application. This testing out process must be continued longer in the school than elsewhere since children's experiences are more limited than are those of adults. They are likely to reach true generalization less easily than adults. It must be remembered, however, that application in this sense is *inductive in purpose though deductive in form.*

Application vs. *Drill.* - From what has been said already it must seem evident that application in the inductive process is doing a thing, not for the purpose of reducing the act to an automatism, but for the purpose of better understanding the principle that controls similar situations. On the other hand, the so-called drill exercises are not intended to give a richer notion of some controlling principle, but to insure the same invariable response to a recurring stimulus.

For example, one may group certain words in the spelling list. After a little he notices in the "*ei*" words which he has before him that in all cases where "*ei*" has the sound of long "*ā*" the order of the letters is "*ei*" as in the word freight. With this principle in mind he examines other words and ultimately concludes that this principle is universally true. This is a case of application. If instead of comparing these words for signs of common characteristics he repeats each word until the letters are contiguously associated the process is one of drill.

Danger of Short-Circuiting in Application. — Nothing is more common or more harmful in school than the habit of short-circuiting. For example, the child in the reading class sees the printed word, and then instead of imaging the idea back of the word before pronouncing it, as he does in actual contact, he "cuts across" from the stimulus of the written word to the mechanical expression of the oral symbol, completely eliminating the essential element — the content. The same fault is common in other subjects. A teacher of physical geography was teaching a class how the direction of winds is determined by a storm center. He showed on the board how the winds blow when the center is at Philadelphia, again when it is at Boston. The pupils helped to recall the "counter clockwise" effect of winds and with the face of a clock in mind they were able to indicate the direction on the board. However, when one student was asked to represent a storm center and move about the room, and the others were asked to point at full arm's length the direction of the wind, all but one or two were baffled. Much of our so-called application is of this short-circuiting character. Excessive verbal mastery of lessons, or even the mere mastery of ideas without their

being enriched from actual experience, results in bad habits of short-circuiting.

Consistent Application. — Application to be consistent must prevent short-circuiting. The individual situation tested must be real to the child's experience — not a "supposed" situation. Better by far is the problem which requires the children to find the actual cost of papering the sitting-room in Willie's home which possibly is being repaired, than to find the cost of papering a supposed room of given dimensions. Problems in fractions involving the cost of the milk which is consumed by the various families represented in the room, at the actual fractional cost per pint or quart are much superior to problems that require the cost of 9 lb. of sugar at $7\frac{1}{2}$ cts. per pound, or 8 bars of soap at $4\frac{1}{2}$ cts. per bar. Application to be of most worth must have the ring of *real worth.*

II. Deduction

It is difficult to explain why methodologists have given relatively so much consideration to inductive processes and relatively so little thought to deductive processes, since most of our values in the after-school days are determined by deductive procedure. Nearly every problem that confronts one from the moment he arises in the morning until he retires in the evening is solved by deductive reasoning. On discovering that it is light in the morning one concludes that it is time to get up. He either implicitly or explicitly proceeds as follows: One should arise at day-break. It is now day-break. Therefore, it is time to arise. And so on through the day, he solves the problems that arise by holding them up in the light of some

accepted principle which he has adopted as a standard for determining individual values.

Doubtless method in deductive thinking has been neglected because it has been assumed that if one understands principles he will be able to solve the problems to which they relate. There is no greater fallacy in the field of education than this assumption. The development of moot courts, internes, practical courses in the household arts, training schools for teachers, experiment stations in the field of agriculture, — all illustrate the fallacy of this assumption.

Deductive thinking consists in controlling particular cases by the application of general principles to them. In this age, when we are so sensitive to the importance of conservation in every phase of endeavor, it is proper and fitting that the deductive approach be critically examined. Such an examination will prevent waste time and energy in the process of obtaining values by deductive reasoning. It is important that the procedure be natural and rational in the interest of economy of both time and energy. In order to evaluate deductive processes in terms of economy of time and energy, it is necessary to lay bare these processes and examine each in terms of the child's interest. Methodologists have made the processes of induction explicit and thereby paved the way for economy in the inductive method of teaching. There is an equally good reason for making the processes of deduction explicit and thereby providing a consistent method of teaching deductively.

Steps in Deductive Thinking

An inductive way of getting an understanding of the deductive process is through an examination of all of the

steps in that process. This can be done by exposing the distinct phases of the process, and then determining their order and relative importance by comparison. The following process in obtaining a value will illustrate this method. A door bell which has been in good repair since it was installed suddenly ceases to ring. The owner has thereby lost the value afforded by the ringing of the door bell. Up to this time this value was controlled by unconscious habit. As he steps up to the door, for the thousandth time, it may be, the hand automatically presses the button. Once the finger is in its accustomed place the muscles contract but the pressure brings no response. A second pressure on the button and — no response.

A Felt Difficulty. — The first conscious response to his failure to control this value in the habitual way *is a felt difficulty*. From the standpoint of method it is essential that one know the factors involved in producing a "felt difficulty." It is evident that the habitual way of getting attention from within has failed to get the *customary response*, and that the *customary response* previously secured by this habit is of value. As the value diminishes in importance a felt difficulty will diminish in like proportion. For example, one starts to cross the street and just at that instant an automobile stops the passage. Though the habit ceases to operate for the moment there is but little "felt difficulty" because the halt is but momentary, and the delay of little consequence.

Examination of Data. — Curiosity is aroused by the occurrence of the felt difficulty, and hence a "tinkering" with the bell follows. In all probability this "tinkering" will consist in repeated pushes on the button, pounding the bell, and tightening the screws and wires. In other

words, this *second step* consists in examining the data most directly and concretely related to the conditions at hand. This step is based upon a knowledge of the gross conditions involved in the ringing of a door bell. It is the step which has to do with the examination of external conditions.

Again a general knowledge of the conditions which determine this type of control is presupposed. Without a general understanding of the conditions there would be little "tinkering" after the "felt difficulty" arose. The disturbed impulses would find no definite outlet.

Tentative Hypotheses. — If a general familiarity with the conditions which stimulate the search or examination exists, the chances are that some degree of knowledge relative to the principles which control these conditions is possessed. If such knowledge does not exist further procedure will stop. If it does exist the *third* factor in the mental process takes form and is known as a *tentative hypothesis*. The number and order of such hypotheses will depend upon the number and order of the principles which the operator conceives to be involved. The following order of principles may occur and thus give rise to the hypotheses concerning the defect in the door bell: 1st, a certain electric potentiality is necessary to ring the bell; 2d, a continuous connection between the two poles of the cell and the posts of the bell is indispensable; 3d, the current passing around the soft iron core must be intermittent; 4th, the spring provided to secure this intermittency must be intact.

Testing Hypotheses. — As each hypothesis is investigated, the fundamental law with which it is associated in consciousness is observed in its essential ramifications. Particular data are examined to see if the law under con-

sideration is being transgressed. One after another of the occurring hypotheses is tested out in the light of an associated principle that is recalled. Through the process of elimination the difficulty is located finally and the condition remedied. This location of the defective condition through the application of known principles is *testing the hypotheses* and is the fourth step in deductive thinking.

Verification. — But no electrician would stop here. After making all of the connections, certainly he would step to the door once more and press the button to see if the result of his handiwork is good. This *fifth step* in deductive thinking is verification. It is the final assurance that the value which was lost by the break in the control of the bell is restored.

An examination of this concrete and practical problem reveals the fact that there is a perfectly natural order in the mastery of this situation; and furthermore that there is a utilization of principles and a constant play of experience from the beginning to the end of the process.

Detailed Analysis. — In view of making each of these steps explicit in its bearing upon method, it is necessary to isolate it and examine its characteristics more in detail. As has been observed already, two essential factors are involved in establishing a *felt difficulty*. One is a failure to secure the customary response, and the other is a realization of the value of such a response. The first of these factors finds its physiological counterpart in habit.

So long as habit secures the value, one is not disturbed and there is no occasion for deductive thinking. The moment that habit fails to secure the value in the customary way, control is broken and the deductive process begins. Consequently a fundamental step in method

involves making the pupil aware that his present control, which heretofore has given satisfaction, now fails to do so. For example, a pupil has not been dissatisfied with his writing though it has been quite mediocre. An investigating committee finds that it takes twice as long to read a page of his manuscript as it does to read a page of manuscript written by the best writer in the class. By this comparison the poor writer is made to realize for the first time that his method of writing works a hardship upon those to whom he writes. Henceforth his old habit will cease to give satisfaction and consequently will not possess value for him. It is evident that motivation begins at this point.

The problem at hand must be either associated with some generic value (instinctive purpose), or it must be related to some specific aim or purpose which the child entertains for himself. For example, the first essentials in motivating the problem, What does the robin feed its young? are: 1st, a certain familiarity with robins, — where they nest, the probable location of food, and a general notion as to how this food is secured, conveyed, and transferred to the young; 2d, and by far the more fundamental factor in motivation, a consciousness of the relation of this information to certain values entertained by the child.

If no specific life interests have been established, such as that of gardening, caring for birds, and protecting trees, it is up to the teacher to draw upon native values. In this case perhaps she should stimulate the social instincts. An appeal to the pride of her pupils may bring success. By making much of the reports that come in she will soon establish values in the consciousness of the children that will impel interest in the means of attaining them. Doubt-

less these values which are inherently related to the social instincts constitute a large part of the propelling force of human endeavor.

The importance of the *gathering of data* for the solution of any problem is manifest in the results obtained. Children, as do adults, stumble more frequently at this point than at any other. Half-baked conclusions are due too often to insufficient data. Real estate agents, patent medicine men and exploiters of all sorts of get-rich-quick schemes are purposely negligent in this particular. All of the essential data would ruin their business. In fact it is the policy of those who desire to force a wrong conclusion to overemphasize certain data and to withhold other data of powerful significance. Persons called before the congressional committee which investigates campaign funds frequently have been skilled in this particular. Politicians usually manifest a similar weakness.

The social stimulus again will aid much in securing the necessary data. Comparison here, as in other phases of school work, should be drawn upon in full measure. Individual reports should be encouraged by keeping full and complete accounts of results and by public mention of the relative value of such reports. Whether it be gleaning facts relative to the robin feeding its young, or finding the conditions of a formal problem in arithmetic, zest for the work and accuracy of discrimination will be enhanced by a large and discriminate selection of details.

A large collection of data intended for the solution of a problem may prove to be only mental curios. This will prove true in case of a limited grasp of principles involved in the solution of the problem. *Tentative hypotheses*, though essential in the solution of problems, depend in their

initial stage upon a consciousness of underlying principles. Determining what is wrong with the door bell by deductive thinking involves an understanding of the nature of an electric current, of good and bad conductors, of the influence of an electric current upon a soft iron core, and of the effect that a magnet has upon a piece of soft iron.

Progress in this phase of the procedure requires familiarity with the principles involved. Hence in the early stages of the deductive process, or perchance before the problem is attempted, all principles involved should be recalled and tentatively applied. Some teachers act upon the fallacious theory that a principle once in the memory is always in the memory. A teacher was recently requiring a class in algebra to square polynomials by inspection. The class had previously worked out the rule by induction, but still its application was vague to them. Half the hour was taken up in "lumbering" and "stumbling" over the problem assigned. Ten minutes spent upon recalling the "rule" and in applying it over and over in specific cases until the notion became workable would have prevented the difficulty.

An abstract knowledge of principles alone will not suffice to make one constructive. One who solves a problem intelligently must have, in addition to a grasp of principles, the ability to visualize a situation where the principle applies. Not all mechanical engineers are inventors. Not all scholars are writers. Not all students of mechanics are architects; and not all lovers of the beautiful are poets, composers of music, or artists. They only become so by developing the constructive imagination.

The school should give training in this aspect of thinking. More opportunity should be offered for applying

principles to new situations. Arithmetic, literature, history, geography, and most of the other subjects are rich in this sort of opportunity. There are times when the teacher should assign work peculiarly suited to develop this phase of thinking, and allow time in the recitation period for consideration of worthy contributions by the class.

Testing the hypotheses is a significant factor in the solution of a problem. In other words, this step consists in making actually real what has been only theoretically real. In the case of the door bell it involves tightening the wires at the posts, adjusting the automatic breaker until it works freely, and testing the strength of the current. In the squaring of a polynomial it consists in actually performing the operations suggested by the rule.

It is important that these processes be as skillful as possible. Speed and accuracy at this stage in problem solving are indispensable. They are attainable only through an enormous amount of drill. This drill should be lively and usually at regular periods. It has been demonstrated by experimentation that students who have been drilled upon the *fundamental operations* in arithmetic make higher grades on examinations involving *thought processes* than do those who have not been so drilled. This is due to the fact that those who are skilled in the mechanical processes have mental energy released for the thought processes, which otherwise would be utilized.

It is relatively easy to build houses, span streams, eliminate trusts, provide prohibition, and irrigate vast areas of arid land upon paper. It is more difficult to do these things in reality. The acid test of the mastery of a principle is in its application. Verification in the truest sense means

such an application. It involves the application of principles to the bank discount with which the local bank has to deal and to the denominate numbers involved in the household problems the several children of the class have to face. In its practical aspect verification means the application of the theories acquired to concrete situations. Teachers who are more than imitators, who teach as they do because of a consciousness of the value of principles involved, will recognize that there is yet an abundant opportunity to make verification explicit. The waste here is just as marked as in the inductive process. Practical results are needed as much here as there.

It is not enough to demand of pupils that they solve problems. It is quite as important that they solve them with as little expenditure of energy and time as possible. The problem should be set so as to arouse a *felt difficulty;* to stimulate a diligent *examination of data;* to provide feasible *tentative hypotheses;* to insure a searching *test of the hypotheses;* and to impel a *comprehensive verification* of the dominant one. When all of these steps have been considered carefully, one may rest assured that the problem is solved satisfactorily.

CHAPTER VII

HABIT FORMATION

Scope of Habit. — The relative amount of habit in the performance of one's work, indeed, in the enjoyment of one's leisure, is greater than he is apt to suspect. From the moment one awakens in the morning until he falls asleep at night, he is constantly exercising this significant form of control. The major portion of life's activities — arising, dressing, starting the fire, eating, discussing the incidents of daily life, walking to and from the car, doing the chores on the farm, in fact, the hundred-and-one other details of office or shop or farm, are mainly automatisms which require little or no reflection or reflective guidance on the part of him who performs them.

With the advancement of civilization comes an increase in the complexity of the social structure. The social organism becomes highly differentiated and specialized, requiring delicacy of adjustment on the part of the individuals who constitute it. Along broad lines the individual's adjustments to the social organism of which he is a part may be grouped into two main classes: those which have to do with an adequate understanding, appreciation, and adaptation of the individual to the social organism of which he is a part; and those which have to do with the special

adaptations he must make in the particular vocation he has elected.

The second class of adjustments does not necessarily require a higher degree of skill than does the first. The particular acts of the painter, plumber, typist, cabinet-maker, weaver, or telegrapher require no more skill than is required in the art of verbal expression, in determining numerical relations, and in conforming to the various conventions which in general weld the various parts of the social structure together. To assume that more skill is required to control a paint brush than to control the "mother tongue" adequately; to set type than to prepare the selection being set up; to "click off" on a telegraph instrument the status of the world's markets than to determine the changed condition of those markets, is absurd. These two classes of skill are different yet both are highly important. It is not true that one is inferior to the other. Both are essential.

It is not our purpose to enter into a discussion of the relative importance of these two classes of adjustment. It is certain that the first class should not receive less consideration as society becomes more highly differentiated. With the breaking down of the apprentice system, the curtailing of the responsibilities of the home, the awakening consciousness of the fact that adjustments of the first class aid the professions more than they aid the trades, there is a growing conviction that the school is not giving sufficient consideration to preparation for the trades. It is pretty certain, however, that the public school will always give first consideration to the establishment of the controls which underlie the broader social adjustments. It will insist upon a basic general education to safeguard

the whole of society before it provides training in vocational skill. Doubtless there should be training for both forms of preparation at the same time.

Relation of Habits to Efficiency

Correct Habits Conserve Energy. — In a discussion on a method of teaching one is more concerned in the relation of habit to efficiency than he is in the general characteristics of habit. The *conservation of energy* is a vital factor in efficiency. In all activities in which habit has not become specific, energy lacks definite control and positive guidance, and consequently is subject to great waste. One who is not skilled in threading a needle will utilize excessive energy in performing the task. Skating, dancing, horseback riding, controlling and directing a new machine, playing a new game, in fact performing any new and unfamiliar activity exhausts the novice, while one skilled in the performances of these acts will experience little or no fatigue.

Correct Habits Release Energy. — Not only do adequate habits reduce the useless expenditure of energy but they release and thereby allow of a redistribution and concentration of energy at the most strategic points. If one is riding a bicycle for the first time it is probable that his mental energy is so consumed in controlling the front wheel in order to maintain an upright position that he has little or no energy left to reflect upon how to dodge the hole in the road which he suddenly approaches. One who has reduced the upright control of a bicycle to habit will have all of his energy free to reflect upon the various possible ways of dodging the hole mentioned.

One dancing or skating for the first time will find him-

self possessed with little brilliancy of thought and unable to hold his own in the conversation indulged in by his skilled companion. Neither will one driving an automobile for the first time be entertaining to his companion, as many an unfortunate victim of such an experience can testify. After specific habits have been formed to control these new situations, mental energy will be *released* and coherent conversations may be carried on.

One who in childhood learned habits of speech which transgress all of the laws of the "King's English" finds much of his mental energy consumed in the mere form of expression, which should be used in rounding out and perfecting the thoughts themselves. Only when one has reduced his language to an automatism is he able to draw upon all of his reserve energy in exposing his convictions to others. In like manner one cannot express his ideas effectively in written form if he is constantly in doubt as to the sort of punctuation he should use, or the spelling he should employ. One cannot make great headway in mathematical computations if he is constantly harassed with inaccuracies in the use of the fundamental processes. Inefficiency in all of these lines of endeavor is conditioned by the consumption of energy that is drawn off to control physical processes which should be reduced to habit.

Teachers who fail to establish the fundamental habits upon which the larger thought processes depend for expression are unconsciously but surely responsible for the life bondage which they unwittingly impose upon the children, through failure to organize their native impulses into definite socially serviceable reactions.

Correct Habits Make for Uniformity and Consistency. — One who has reduced writing to a habit may be depended

upon to reproduce consistently the same form with which he begins. The truth of this statement is supported by the practices of banks and courts in determining the authenticity of handwriting. One who has reduced spelling to an automatism will be consistent and uniform in his spelling, though he may not always produce conventional results. A dependable person is one who has reduced the fundamental *virtues* to habit. When one is punctual, honest, industrious, loyal, and self-sacrificing through habit, rather than through sheer will power, his dependability is a certainty.

Habits the School Should Establish. — As has been pointed out, the first responsibility of the school is to initiate the child into those branches of knowledge which are especially qualified to adjust him to his complex social environment. Most of the subjects of the elementary curriculum are for this purpose. They have persisted because of their broad cultural value. These subjects depend upon a relatively few fundamental factors. It is the business of the school to search out and habituate these, that mental energy may be released for the thought processes required of each pupil.

The mechanics of reading, pronunciation, articulation, the massing of words, and the relative emphasis of phrases and clauses in the sentence, and the searching for difficult words in advance of oral reading, are essential and fundamental processes which should be habituated if the mispronunciation of simple words, repetitions, substitutions, and omissions are to be reduced to a minimum.

The fundamentals of language should receive like attention. The person, gender, number, and case of nouns and pronouns; the tense, mode, and number of verbs

and the degrees of adjectives are some of the essentials that are needed daily, and consequently should be understood and made automatic.

The fundamentals in arithmetic should receive similar treatment. Notation and numeration; the four fundamental processes of addition, subtraction, multiplication, and division, with the mechanical devices best suited to give them expression; the tables in denominate numbers; and methods of attacking problems in percentage and mensuration are a few of the operations in arithmetic that should be *drilled* and *drilled* until proper habits are formed.

It is unfortunate that the fundamentals in other subjects are not more highly differentiated than they are. Investigations are revealing some of these. Others will follow. In geography we know that direction, prevailing currents of both air and water, elevations, great trade routes, great commercial centers, the relation of industries to their environment, the relation of climatic conditions to the industries and to civilization are such fundamental factors that they should be reduced to automatic control.

The phases of school work which are intended to give specific vocational training are rich in processes which should be reduced to habit. Stenography and typewriting in our commercial courses are examples. The typist who is prepared to demand a good position in the business world will have reduced all of the movements on the keyboard of her machine to habit. Her automatic nerve centers must swing her fingers up and down the keyboard with absolute certainty while she unravels the thought processes she is to express in type. As the school undertakes more and more training of a strictly vocational character its responsibility in habit formation will increase.

Much of the poor work that is done in the teaching of fundamental habits is due to a few very definite causes: inability to appreciate the value of good habits, insufficient knowledge of the fundamentals which should be habituated, lack of consistency and persistency of purpose in establishing these habits, and lastly, unfamiliarity with effective methods of establishing habits. From the viewpoint of method the last point is most significant.

Method in Habit Formation. — It were futile to point out the things that should be done and leave unsettled the way best fitted to do them. Ninety and nine are wont to point to the goal that should be attained to one who comes forward with a practical way of attaining it. This is as true in method as it is true in religion, ethics, politics, and in other forms of endeavor. It is passing strange, however, that relatively many point out suitable ends of attainment to the relatively few who master the means of attaining these ends.

The ninety and nine referred to in the above paragraph have not determined the particular topic at hand. Fortunately for the practitioner there is an abundance of definite method available for his guidance in the teaching of habits. And while we do not hope to add to, or make more explicit, what has been presented already by others, it is hoped that a discussion of the various steps in the process, with illustrations drawn from experience, may be helpful to those who have had limited training in this field.

First Step in Teaching Habits. — Since habit formation involves a succession of definite acts, it is important that he who performs a series of acts understand the thing to be done sufficiently well that the successive acts be consistent. Inconsistency in habit formation, as in ethics,

through neutralizing the effect tends to maintain the zero point. Therefore, in this process a clear understanding and frequently a clear demonstration of the habit to be attained is the first prerequisite. As Rowe points out, the first step in applying the recipe for "rabbit stew" is to "catch your rabbit." The first step in habit formation is to determine the habit to be formed. Demonstration is usually the best way of getting this phase of the process consciously before the children.

If children go down the steps noisily, it is plainly the business of the teacher to demonstrate, or have some pupil demonstrate, a quiet and easy way of descending the stairs. If the seat positions are generally bad there should be a demonstration of good positions. If high-school students walk heavily over the floor, a demonstration of a quiet way of walking, by both teacher and pupils, should be made after attention has been called to the noisy walking in vogue. If the voices of the children in the reading exercises are pitched too high or too low, the proper pitch should be presented to them. If the handwriting is of bad form, the folding of paper poorly done, or what you will, in the interest of conservation the right form should be contrasted with the wrong form that responsibility may be placed where it belongs, not with the decided purpose of placing responsibility, but, as Bagley points out, for the purpose of "focalizing the attention upon the thing to be done." [1]

Though this first step often lacks definiteness and detail and though there is often an insufficient amount of comparison to insure a definite notion, in the main it can be said that society has always been relatively long on this

[1] *Educative Process*, Bagley.

phase of the process. This is illustrated in the words of Portia: "I can easier teach twenty what were good to be done than be one of the twenty to follow mine own teaching." [1] Indeed, it is traditional that mankind is inclined to be more interested in what *ought* to be done than in the specific ways of its accomplishment.

Second Step in Teaching Habit. — Once the thing to be done is clearly understood, the biggest problem of habit formation confronts the teacher; namely, the *launching of as strong and decided an initiative as possible*,[2] a deduction which James made from Bain's treatment of "The Moral Habits." To throw the self into the undertaking with all the power one can summon is essential to an accomplishment. Again we know what ought to be done but just what stimuli to control and how to control them are the problems that perplex the beginner when he finds himself high and dry upon the shore line of failure, after the first wave of mere curiosity has spent its force.

It is in this second step in the process that the "born teacher" shines. In fact the possession of this power usually wins for its possessor the enviable title of "a born teacher." Doubtless such teachers have been able to analyze their own motives and those of their children more easily than have the less efficient in the profession, and to put into practical operation the generalizations thus obtained. And while all great teachers doubtless possess the innate capacity to grasp and apply this vital principle, it does not follow in any sense that this control cannot be acquired by those who possess less training and natural ability; nor does it follow that the so-called "born teachers" cannot be improved by systematic training in

[1] *The Merchant of Venice*, Shakespeare. [2] *Psychology*, James.

this field. The fact is that experience justifies the opposite conclusion.

Back of this strong and decided initiative is an emotional matrix that is the key to the situation. The great leaders of all ages have understood this impulse to action and they have known how to stimulate it effectively. Feeling is the essence of the impulse to action; and he who can stimulate it *systematically* and *consistently*, and properly associate it with the desired action, will have little trouble in securing coöperation in any enterprise that he sees fit to undertake.

The teacher's problem is a practical one. How can one *systematically* and *consistently* stimulate children so as to arouse this emotional response? With most teachers who are successful this process is implicit. They know that they do it, but they have never carefully analyzed the process into its several steps. They are masters of the art, but they are unable to guide their pupils to a mastery of the same art. It is at this point that the supervision of teaching will break down unless the *how* can be discovered and passed along to the one being supervised. Many an excellent teacher is of little value as a supervisor because he is unable to reduce his art to the fundamental principles which underlie it.

This emotional background is undoubtedly the great source of *racial and personal* values. The former is ordinarily attained through instinctive functioning, and the latter is secured by the emotional attitudes that have been engendered through personal and racial experience. The teacher who is to determine the destiny of the children whom she teaches must harken back to these fountain heads for inspiration and propelling impulse.

The value of the instincts in this phase of method is enormous. On entering school the child has few conscious values, growing out of experience, that he wishes to control. He is brimful of curiosity, pride, and pugnacity. These three instincts alone furnish an equipment for wonderful results. The first holds the attention fast to the folk-tales presented in the primary grades, when handled *skillfully* by the teacher. Curiosity must be appealed to. *Concreteness* is an essential in stimulating it. The illustrations of present-day readers are excellent in this connection. Some of the child's experiences relevant to the incidents of the story should be recalled. Illustrative drawings upon paper and upon the board by the children will add to their quota of interest. Modeling in clay will aid the constructive imagination while the intonation of the teacher's voice, facial expressions, expressed anxiety, all tend to stimulate this instinct until a high degree of enthusiasm is aroused.

While this many-sided appeal to the child's curiosity is usually sufficient to maintain a high degree of attention in the story, it will take more than this to keep up the interest until new words are learned, new accents mastered, and a freedom of movement is attained. At this point the teacher should draw upon the spirit of emulation. The pride and pugnacity of the child should be appealed to. It is these instincts that generate a flood of enthusiasm upon the playground and upon the athletic field. They produce *skill* in shooting, riding, and swimming; in baseball, tennis, and basket ball; in billiards, tenpins, and golf. They are frequently the power back of social organizations, business enterprises, and combinations in trade and politics. They ramify and stimulate our whole social structure from the

simple games in the nursery to the great maneuvers upon the board of trade.

The teacher should draw upon these instincts wisely and continuously in those phases of work which in the beginning are not interesting. Spelling, writing, and pronunciation may be interesting to the children of the grammar grades and to secondary students because they are capable of recognizing the relation of these things to the ends they have set up for themselves to accomplish. Not so with small children. The intrinsic value makes little appeal to them. The social instincts can always be relied upon to make a direct appeal. And while one should be judicious in the stimulation of these instincts he need not be so conservative as the puritanic school of educators is accustomed to advise. An appeal to one's own experience is sufficient to substantiate this statement.

With the growth in the experience and maturity of the child there should be consistent shifting of emphasis from these instinctive values to those growing out of experience. Neither value will long be absent from the child's consciousness. It is a question of relative emphasis that the teacher must take into account. If the proper emphasis is placed upon these values, the time should come soon when the child is anxious to master the processes of arithmetic because they will give him quantitative control of some value which he has set up to secure. Because of his liking for spelling, history, physiology, or other subjects, he sees that these subjects relate directly to the thing he wishes to accomplish.

One test of good teaching is the character of the motive that prompts the act. This is just as true in the method of habit forming as it is true in the mastery of inductive and

deductive controls. Ultimately the student should be interested in improving his writing for the social service it will render him. His interest in perfecting the fundamentals in arithmetic, a good form in language, the retention of the salient facts of history, should ultimately be coupled with the intrinsic and specific values of these subjects.

If the teacher wants to arouse a maximum emotional response for the drill work undertaken, in the first place he will bring into the child's consciousness the significance of the habit to be established. To this end life aims must be built up and associated with the proposed habits. In the second place he will stimulate the social instincts to supplement the motive generated by these life aims.

In geography one can interest pupils in the location and boundaries of political and physiographical divisions, in the location and the population of cities, and in the distribution of products and industries, by showing that this information will materially aid them in interpreting the articles they read in papers and magazines on travel, and especially on industrial pursuits. As maturity increases, and a personal sense of social obligations is more clearly understood, the teacher may increase the emphasis upon this appeal. Because it is the main appeal of maturity, it should not be neglected in guiding the child's activity.

Third Step in Teaching Habit. — One may be momentarily interested in the formation of some fundamental habit and yet not have the stamina or strength of character to hold fast to the purpose he has set out to attain until he accomplishes it. Consistency of purpose is a necessity in the establishment of habits. Impulsiveness, changeableness, and fluctuating enthusiasm will frequently need

to be overcome in the fight for automatic control. One thing is certain, and that is that there must be no "backing down," no "letting up," until the habit is formed.

Many teachers of magnetic personality who understand how to arouse appropriate emotional responses fail in the formation of fundamental habits because they do not realize that permanent habits are extremely hard to form, and that they are formed only after persistent and constant repetition.

Repetition is the watchword. Not mere repetition, but repetition saturated with enthusiasm and differentiated at critical points by sharp discrimination. Repetition in concert is ineffective as a device in habit formation because the cognitive factor is in the background. In learning to count, a child will say over and over again 11, 12, and 15, unless his teacher establishes an association with 12 which will force 13 instead of 15 into his consciousness. Discrimination is essential to patch up the little defects in the habit. Memory gems are too frequently taught by the concert method. Since the rhyme is learned easily, the teacher draws a wrong conclusion as to the value of concert work in the teaching of habit.

School administration offers a very serious drawback to the formation of adequate habits, in that it interferes with the proper amount of repetition. Teachers usually cut the course of study into eight sections. The teacher of each grade feels responsible for everything assigned to her. From the standpoint of knowledge this can be cared for easily; from the standpoint of habit, never. Teachers who are conscious of the significance of repetition in the process of establishing habits will never assume that the drill work done in the preceding grades is adequate. *It*

makes no difference how well it was done, it needs to be checked and tested at intervals to insure permanent results.

Teachers in the intermediate and grammar grades should interview the former teachers of their children in order to determine more clearly their essential needs. Teachers should familiarize themselves also with the course of study to the extent of selecting the fundamental drill exercises involved, that nothing which ought to be done will be neglected.

We have experienced much of the cyclic presentation of subject-matter, and while a moderate use of it is justified by good pedagogy it is reasonably certain that fewer cycles will be needed if administrators see to it that the fundamental skills be accumulative in character by passing them on to successive teachers. In a way this is still largely an implicit responsibility. Never will the child come into his own until it has become explicit in administrative and professional circles. Some one will say that the overcrowded curriculum precludes the possibility of carrying out such a visionary scheme. Not infrequently subnormality with its accompanying slow rate of classroom work is due to failure in the fundamental habits. Students with good memories (so-called) usually rank high in class work and make advancement easily. If one through proper systemization and coöperation can make all the children's memories relatively good, he will have more time for supplementary work.

Attentive repetition is a responsibility that rests not only upon the work of the particular classroom and the particular teacher, but upon supervising officers and those who are responsible for the carrying out of the course of study. Frequent visitations of grade teachers to rooms above and

below their own, conferences by supervisors relative to the extent of carrying this work on from grade to grade, to detect if any teacher or group of teachers is neglecting this responsibility, will make for better conditions than one is likely to realize through unsystematic effort.

Fourth Step in Teaching Habit. — The oft-quoted remark of the immortal Rip that he would not count this one [drink] has a positive significance in the establishment of habits. As Professor James pointed out, "He may not count it, and a kind Heaven may not count it; but it is being counted none the less. Down among his nerve cells and fibers the molecules are counting it, registering and storing it up to be used against him when the next temptation arises." [1] It is the exceptions, either by consent or habit, which open the floodgates of the impulses, permitting them to flow down the old habit path only to make resistance to the new order greater than ever.

Once a movement is on foot to break up a bad habit by the substitution of a new one, after the foregoing steps have been taken, the teacher must be *eternally vigilant* to the end that no exceptions occur. Frequently teachers set out to secure better positions, better grammatical form, better articulation and pronunciation, better writing, and many other things, but soon fail to maintain a persistent unswerving front, with the result that little or nothing is accomplished.

At first there is frequently an abundance of enthusiasm and everything goes on well. Then unexpected troubles begin. The most obstinate boy in the class, apparently by mistake, neglects to do the thing required. The teacher tries to justify this lack of duty on various grounds. Soon

[1] *Psychology*, James.

others do likewise until the attempted reform has passed into "ancient" history and the children are more deeply rooted in the wrong habit than before the reform was attempted.

More success in this sort of endeavor will be attained if relatively few difficult things are attempted at one time and if those few things are held to tenaciously until the victory is won. If rightly won, it will be enjoyed by students and teacher alike. We must insist that it will never be economically done until the student does enjoy the new skill he possesses.

The four steps enumerated above — the first by Bagley, the second and third which are deductions from Bain by Professor James, and the last by James — should be made explicit by teachers who are really concerned in teaching habits economically. Teaching fundamentals are no less subject to fundamental laws than are the other endeavors of man. It is only by a scientific application of these laws that fundamental skills can be taught most economically.

CHAPTER VIII

THE EMOTIONAL FACTOR IN TEACHING

Emotional Aspects of the Self. — Rational and automatic controls have been treated as if each were a distinct and separate faculty functioning independently in the control of human affairs. In reality nothing is farther from the truth. They are but two aspects or manifestations of the many-sided self in its attempt to come in contact with and to control its environment. Each has been treated separately to insure a greater degree of simplicity and clearness. In like manner and for the same purpose, the *emotional aspect* of the self is to receive separate and isolated treatment here.

The emotions are a potent factor in the stimulation and direction of one's thoughts and actions. Emotional inertia is coexistent with intellectual and motor inertia, and vice versa. A great crisis like the World War stirs the emotions, which in turn whip the intellect and will into a state of amazing virility. Mob psychology and business acumen, alike in the last analysis, reveal a dominant emotional factor.

Interest

Though interest is a common phase of the emotional factor of method, from the standpoint of both terminology and content, there is an abundance of evidence to warrant

the conclusion that its meaning is not always explicit even to many who use the term fluently. This is due in no small measure to an overlapping terminology both in pedagogical literature and in common parlance. It has been due also to a willingness on the part of educational writers to employ a traditional technique somewhat remote from common usage. Common usage is necessarily most easily understood and consequently is the most effective terminology one can employ, provided the content is definite and explicit.

Simple Interest. — "Isn't it interesting?" and "wasn't it interesting?" are very familiar questions. These remarks are interesting in this connection because they afford an opportunity to lay bare the meaning of the interest referred to. "Interesting" as here used means possessing the quality which stimulates curiosity with its accompanying feelings and arouses a sense of the unusual, the familiar, or the new. An interesting thing possesses qualities which in themselves give satisfaction because they arouse an instinctive reaction, either emotional or intellectual, or both.

A stranger in the community, the first airplane, a large pumpkin, situations in contrast, new clothes, the return of an old friend, and an exhibit of superior products are examples of situations which interest one because they make the instinctive appeal referred to above.

Twofold Aspect of Simple Interest

In simple interest two factors are involved, namely, the unpurposive self and the situation which stimulates the instinctive response. The self in the case of simple interest has no "axe to grind." It is unconscious of a purpose to be fulfilled or an end to be attained. It simply is yielding

to the stimuli of its immediate environment because of the satisfaction they give. The attention manifestly is spontaneous. The *emotional element which sustains this attention is simple interest.*

A Biological Background. — Simple interest is therefore instinctive in origin. The child comes into the world with many ready-made reactions to stimuli, the function of which is to generate this form of interest. Only two conditions are required to produce simple interest, appropriate stimuli and a normal condition of the instincts with which to respond to these stimuli.

The inclination of children to discover, to investigate, to know, to understand, to play, to enjoy stories, and to appreciate the new or the unusual is a manifestation of the normal functioning of the most fundamental of the human instincts.

Suitable Stimuli. — The responsibility of the one who would direct the unfolding life of the child is both manifest and enormous. The instincts which spur the child to investigate and better understand his environment should be nurtured by supplying stimuli best suited to keep them functioning naturally. There should be ever present a genuine mixture of the new, the unusual, and the familiar. Such a mixture provides adequately for both the gradation and sequence of materials. It imposes upon the teacher the responsibility of systematizing the stimuli he employs.

Importance of Simple Interest. — The early appearance and strong manifestation of simple interest in the life of the child indicate its fundamental character. It is the key to sensation and subsequent steps in conception. It stimulates activity and thereby provides for normal physical development. Stimulated under proper conditions, it is

an elixir of life to the growing child. Substituted for motive, it dwarfs the spirit of research and investigation by requiring an ever-changing environment.

Motive

The term motive, like that of interest, is familiar both in common parlance and in the technical language of the student of education. There is no good reason why a single meaning for it should not be commonly accepted and thereby avoid the confusion which frequently arises when the term is used.

Its Use in the Law. — In the law the term motive has always had a specific meaning. This meaning has gradually filtered through to the masses who use it intelligently. Oftentimes in criminal cases the whole trend of the procedure of the prosecution is to establish the motive of the defendant. What the prosecution means by motive is implicitly understood by both the defendant and the jury. A simple analysis will lay bare the factors of motive.

The Threefold Aspect of Motive. — Every motivated act consists of three distinct conscious states. First, the actor is clearly aware that he is performing the act in its various stages of progress; secondly, he is conscious of a certain end, or goal, or ideal, which he wishes to realize; and thirdly, he is conscious of the relation of the act performed to the value which he wishes to realize through the instrumentality of the act.

If the defendant can establish the fact that he was not conscious of the value referred to by the prosecution when the act was performed, or if he can prove that he was unconscious of the relation of the act to the satisfaction he admits, or if he can establish beyond the shadow of a doubt

that he was unconscious of the act when it was performed, he will be acquitted on the ground that he had no *motive* for performing it.

It is in this specific sense that the term motive is used here. Motive differs from simple interest in that it is always associated with an act which the self performs, not for the direct satisfaction of the act, but for the satisfaction which comes to the self as the result of its having performed the act.

The Meaning of Motive. — One spades the garden, plants potatoes, cultivates them, and finally digs them, not because these several acts in themselves give satisfaction. As a matter of fact, they seldom do. But because the self by means of the imagination keeps before itself the satisfaction of possessing and eating the potatoes which will result from the aforesaid acts. One's staying on the job to the end depends upon his emotional status. If he likes potatoes and can keep before himself in imagination this feeling of satisfaction, to the degree that it outweighs the dissatisfaction resulting from the labor involved, the work will go on to the completion of the job. If at any time the imagination wanes while dissatisfaction for the work increases, there is likely to be a discontinuance of work. A genuine motive is present when the self is keenly aware of the satisfaction which will result from the act being performed. Motive is the emotional aspect of an act which is performed in behalf of some premeditated goal.

The Twofold Nature of the Goal or Ideal

The values associated with a motivated act are either generic or specific. The former is not inherent in the act itself, while the latter is directly related to and dependent

upon it. For example, a pupil may study chemistry for credit in order to be able to announce glibly to the world that he possesses a knowledge of chemistry, or to show that he can talk intelligently upon matters pertaining to atoms, molecules, and compounds. The end sought is not alone dependent upon chemistry. He is using chemistry as a tool with which to gain distinction, social recognition, a social superiority. He may gain this same distinction through a study of history, literature, geology, or any other subject. Consequently, the value uppermost in the consciousness of this pupil is *generic* in character. *Generic values may be obtained in many ways and by a study of different subjects.* On the other hand, if one studies chemistry in view of a better understanding of medicine he is seeking a value which no other subject can supply. Such a value is inherent in the subject. It is a *specific value.*

Generic and Specific Values. — The educational significance of these two values is far-reaching. The ultimate consequences of seeking either of these values, psychologically speaking, are as unlike as the results of playing store and those of actually running a store; of telling how a family should be reared and actually rearing one. The former dominates on the playground, in the kindergarten, and the primary departments; the other prevails in practical life outside the school, and should dominate largely the work of the intermediate and grammar grades and that of institutions of higher learning.

If pupils do not develop early an interest in subject-matter because of a consciousness of its relation to certain aims and goals they have set up or should set up for themselves to realize, and if they do not develop a *subject-matter bent* before leaving it, serious consequences will follow.

Such a condition prevails when pupils remain in school through parental pressure, when they drop out of school on reaching the legal age, and when they discontinue school on the completion of the grammar grades.

Holding pupils in school by stimulating immediate interest or by an appeal to generic values is better than turning them out. It does not compare in value to that which exists when subject-matter is studied because of its direct bearing upon a certain purpose which the pupil has set up for himself to realize.

A Proper Use of Generic Values. — Specific habits are most economically established when the initiative and enthusiasm required in their formation are supplied by an appeal to generic values. For this reason an appeal to generic values in the elementary and intermediate grades is legitimate. Unless, however, serious consideration is given to the intrinsic function of subject-matter, pupils will tire of school in the intermediate and grammar grades and choose to leave it. Fortunate is the pupil whose teacher gives major consideration to the specific values of subject-matter and draws upon generic values only for supplementary drill on the fundamentals.

Play, Work, and Drudgery

Play. — The classification of systematic human activity into three classes is a psychological one. In the last analysis this classification is based upon satisfaction. If the act itself gives satisfaction without thought of a more remote object of attainment, the activity is play. "Dropping the handkerchief," "blind man's buff," "golf," "baseball," — indeed, fancy work, reading, design-

ing, playing the board of trade, and similar activities may be play for some who indulge in them.

Work. — Work differs from play in that the activity indulged in, though not distasteful, would not be performed were it not for the satisfaction which the self anticipates will result *from* the act and not *in* the act. If hoeing potatoes were play, one would deem it a privilege to hoe in his neighbor's garden. It is not the satisfaction from the hoeing that keeps one on the job, but the anticipated satisfaction resulting *from* the hoeing. Hoeing, therefore, under such conditions is work. Most of life's problems require work to solve them, and most of the genuine happiness in the world comes in the form of anticipated satisfactions which are associated with the activities of daily life.

Drudgery. — The happiness of play and work is intermingled somewhat with drudgery. Strange as it may seem, drudgery too is a psychic quality. What is play for one may be work for another and drudgery for a third. It all depends upon one's habits, experiences, condition of health, and the fruitfulness of his imagination. Activity does not become drudgery when it in itself gives satisfaction to the actor or when an anticipated satisfaction stimulates the act. It does become drudgery, however, when a disagreeable act is performed to prevent a positive dissatisfaction which is greater than that caused by the act. For example, the manual work of prisoners is usually drudgery. The *activity* does not satisfy and the *result* does not satisfy, because it does not in any way affect the aims and purposes of the doer. The prisoner works because the dissatisfaction caused by the work is less than that which would follow the punishment that would result from his refusal to do what is demanded of him.

The educational bearing of these three forms of activity is significant. The problem at hand should be so related to the pupil's life that it will appeal to his basic instincts and thus produce play; or it should be so related to his aims and purposes that it will arouse anticipated satisfaction and thus produce work. If school activities cannot be related to the pupils' values they should be discontinued. The moment school work becomes drudgery it generates a feeling of *aversion* for the subject-matter related to it and thereby makes further work upon the subject *distasteful and unsatisfactory.*

Examples of Drudgery. — Keeping children in after school to complete an unprepared lesson, the reading of a selection a number of times as a punishment for failure to prepare it properly, the spelling of a list of words a hundred times, or the solution of a problem twenty times, are examples of devices employed by inexperienced teachers. These make school work drudgery and consequently create a feeling of aversion for the already neglected subject and thereby make its accomplishment much more difficult.

Ideals and Prejudices. — The significance of ideals as positive educational agencies has been implied in connection with motive and more specifically in connection with generic and specific values. Both of these values are *idealized* satisfactions. Without flights of the imagination in which the self holds before its consciousness, as it were, situations not as they are but as it would have them and without ideals to stimulate and direct human energy, progress is at a standstill, work degenerates into drudgery, and hope vanishes from the human breast.

One of the most worthy aims of modern education is to nurture the unfolding imagination of children. Literature,

art, and design; history, geography, and civics — in fact all subjects properly taught stimulate this unfolding of the imagination and thus pave the way to new values, new problems, new forms of work, and new forms of happiness.

An *ideal* is an offspring of the creative imagination, which has no concrete counterpart, though it has characteristics which give satisfaction greater than do those of the concrete with which it is most closely associated. The satisfaction it arouses possesses the self. One's psychic energy is focused upon the ideal because in a very true sense it *has a pull* upon this energy. Closely associated with the ideal, though often contrasted with it, is another very important educational factor — the *prejudice*. It differs in function from the ideal in that it seems to *hold* or *push* the directing energy of the self rather than *pull* it as in the case of the ideal. A religious or political prejudice causes one to "stay put." Under such conditions he is satisfied with prevailing conditions. When thus affected he has a feeling of repulsion for other religions or other parties. They seem to keep him from them by a *psychic push*.

As a rule prejudices retard human progress. They prevent adjustments and are the source of much stupidity. On the other hand, certain prejudices are safeguards of human welfare. A prejudice against lying, stealing, deception, disloyalty, and the slacker make the straight and narrow road to duty not only easier, but more certain of being traveled.

A great responsibility rests upon one who prejudices the minds of the young. The responsibility is great because of the psychic tenacity of the prejudice and because of its far-reaching results upon the life of its possessor and

upon those whom he influences. The great wars of history, religious persecutions, and non-adjustments of many sorts can all be traced to ulcerous prejudices which beset the talents of men. Our guidance in this phase of teaching has been anything but explicit. Each teacher has followed his own will and the dictates of his own conscience. The law of chance has been uninterrupted. The effect has been a slow and laborious struggle in every progress the world has made. The great World War is an objectification of the harmful prejudices that were generated through the unwise direction of the peoples of the Central Empires. With our present status of knowledge it is safe to follow the advice that one should attempt to establish only those prejudices which have a universal sanction, and consequently strike at the very heart of human happiness. Prejudices against dishonesty, deception, untidiness, irresponsibility, disrespect, shiftlessness, civic indifference, and ignorance are of this character.

On the other hand, the prejudices which hamper freedom, progress, happiness, and a universal outlook, should be mellowed and ultimately dissipated. Universal knowledge, research, a broad social contact, and especially participation in the activities affected by the prejudices will do much to atrophy them. There is still need of much detailed method in this field.

Summary. — Viewed from the standpoint of the emotions, good teaching consists in a judicious stimulation of simple interest and motive and in a wise development of suitable ideals and prejudices. There should be a gradual growth from a dominance of native interest (simple interest) which controls the child's activities when he enters school, to a dominance of motive for subject-matter because of a

consciousness of its relation to vital life interests and problems.

Simple interest is peculiarly well-suited to stimulate sensation, to energize drill exercises, and to supplement motive in times of fag and distraction. Motive, on the other hand, is an indication of a definite purpose. Under its spell pupils have a definitely established aim and proceed to select and apply materials in its realization. It is the dominant emotional stimulus of after-school days, and consequently should be initiated early in the school career of children.

When simple interest is the dominant stimulus to pupil activity, such activity is *play* for the child. When his activity is directed by *positive* motive he is at *work*. When he performs an act because of a *negative* motive the act is *drudgery* for him.

Since ideals and prejudices are important factors in motive and since they may or may not be in harmony with the social welfare, it is highly important that the teacher stimulate only those ideals and prejudices which are in accord with social sanction.

CHAPTER IX

MEANS OF GENERATING RESPONSIBILITY

The Meaning of Responsibility. — The state has prescribed an age of responsibility. By this is meant that the individual has a free will in conducting his legal affairs. An "age of responsibility" has a more subtle and significant social meaning than this, and one fraught with greater social significance. It means that one has acquired the power of self-direction, including the twofold process of selecting aims and the specific means by which the aims can be realized. It means that one who is responsible is free to initiate endeavor and that he must take the consequences of the results of such endeavor, or lack of endeavor, at whatever cost.

The presence of a *sense* of responsibility, wherever and however it may be manifested, indicates that the individual has come into his own right as a social factor. It means he has cast off the last vestige of overlordship and has emerged into the full stature of psychic life.

Earmarks of Responsibility. — The psychic characteristics of such a changed condition are manifold and significant. Interests are more highly specialized than before. Selected processes are more in evidence; evaluation is a more dominant factor; and energy is more specifically directed in the laying out and execution of plans. Psychologically one has passed from the dominance of generic

values to that of specific values; from a state of dominant external influence to one of internal direction.

The Evolution of Responsibility. — A sense of responsibility is an acquired and not an inherited trait. In this respect the child is largely a victim of his environment. His institutional contacts — the home, the church, and the school — are by far the most influential of the environmental agencies which determine his destiny.

The home is perhaps a more potent agency in the creation of responsibility than is the school. The church, because of its limited opportunity, is the least significant in this connection of these institutions. Herbert Spencer pointed out that one of the fundamental aims of education is adequate training in the "rearing and disciplining of offspring." [1] For some unaccountable reason the school has lacked either the insight or the courage, or both, to face this responsibility.

We have seen fit to enrich the ideals, to increase the knowledge, to determine the skills of pupils, while we have refused to supply instruction and training in the high schools, which bear directly upon the home training of children. This position of the public school is analogous to that of a state which provides no educational direction for its future citizens. The position of the school in this matter is so obtuse and the results so far-reaching, that one wonders why private schools do not engage in this work. The business acumen of private educators has often led them to sense public needs before those who direct the agencies of public education. This crying need of society may give occasion for history to repeat itself.

The above suggestion is an infringement upon the right

[1] *Education*, Spencer.

of students of school administration. Our specific purpose here is to point out ways and means of conducting the classroom in order to economize the time and energy of pupils by pointing out practical ways of stimulating a positive degree of responsibility.

Character of Teaching When Responsibility is Absent. — Teaching which touches the "learning spot" before a marked sense of responsibility has been established is indeed a fine art. It involves an explicit understanding of individual characteristics, of racial tendencies, of values associated with both, of established habits and their bearing upon the learning process, and of the appropriate stimuli to use under the circumstances. In this stage of teaching the responsibility is primarily with the teacher. She may assume it, or she may shirk it and thus be a drag to the proper unfolding of the child's life. In the latter event, there may be no prick of conscience or no retribution on her part, but there will be an unnecessary impediment in the life of the child, an impediment which society is morally obligated to prevent.

As the pupil becomes more and more self-directing, teaching as a consciously directed process becomes less necessary. It behooves the teacher of children, therefore, to arouse this sense of responsibility by every means known to the profession. In the present stage of method one can scarcely hope that a discussion of this topic will exhaust the list of means, or evaluate satisfactorily the relative merit of each member in the list.

Subject-Matter: A Positive Means

A most wholesome and far-reaching means of arousing responsibility is subject-matter itself. It is both positive

and concrete. Responsibility develops from a thorough understanding of the sequence of topics in an organization, and of their relative value. It is the type of responsibility possessed by true scientists, historians, economists, artists, — in fact by all who have mastered a particular section of the world's knowledge. It is the sort of responsibility possessed by Darwin, Koch, Pasteur, Gibbon, Macaulay, Galton, Kidd, Spencer, Franklin, and a multitude equally illustrious in their respective fields of knowledge.

Once imbued with the spirit of investigation and research, and fired with a desire for greater insight and a more thorough mastery of materials, the pupil is well on the road to independence and self-direction.

The Function of Organization. — An advance towards a sense of responsibility is attained when the pupil conceives the inner relation of structure and function. Until he becomes conscious that purpose determines structure and consequently is revealed by it, he will not take pride in perfecting his own handiwork or find pleasure in scrutinizing and evaluating the handiwork of others. Teachers who do not stress order, consistency, relative values, and the intrinsic function of subject-matter have not taken advantage of their opportunity to enlarge the child's sense of responsibility.

The Causal Factor. — Once the relative value of the parts of an organization is known, it is a much easier task to recognize the causal factor. Nothing will give a keener edge to the intellect than experience in determining the causal factor of events and situations. Who has not observed the wonderful intellectual development of pupils which resulted from a brief course in physical geography, physics, botany, chemistry, economics, or sociology?

Many instructors either stop short of the causal factor entirely or fail to make it explicit. It is not enough to know that water runs "up hill" in a siphon, that great beds of coal and oil are preserved deep in the earth, that lime-water will cure certain forms of indigestion, that a balanced ration for animals pays, that ventilation is important, and that the coldest water is at the bottom of the pond until the temperature of the pond reaches four degrees centigrade or lower, and then it is at the top of the pond. The child has an inalienable right to know why all of these things are true.

A longing for the truth is the by-product of systematic truth getting. Pupils who have been taught to search diligently for the *why* and the *wherefore* of effects, and who through such teaching have found genuine pleasure, will continue in this attitude of investigation when dependent upon their own initiative. Teaching might well be judged by the investigating attitude of the pupils taught.

Mastery of Fundamentals. — Effective investigation depends in a large measure upon one's equipment to carry it on economically, from the standpoint of time, energy, and relative worth. Relative worth is closely related to one's standards, both subjective and objective. Economy of time and energy depends in a large measure upon the character of one's fundamental habits. This is especially true in the mastery of subjects which involve a high degree of technique. One must have reduced the fundamental processes to habit before he will find satisfaction in any investigation involving arithmetical values. Without such a mastery mental energy will not be sufficiently released to accomplish what the self will respect. An attempt to express one's views in a foreign language, or to reveal one's

notions through an unfamiliar art exemplifies the importance of a mastery of the fundamentals in any field of endeavor.

Practically all pupils enjoy the initial phases of foreign languages, mathematics, grammar, natural science, economics, and sociology. Only those who acquire a fair degree of mastery over the fundamentals continue to relish these subjects later when success with the new aspects depends upon a thorough mastery of the old.

In all subjects in which the efficacy of the main structure depends primarily upon a fundamental foundation, good pedagogy as well as good sense warrants that a relatively large portion of the time be given to virile and exhaustive reviews.

Problematic Assignments. — A sense of responsibility comes from one's meeting his specific obligations in solving problems. Such obligations are easily imposed through the instrumentality of the assignment. The mastery and definite report of problematic assignments will inculcate ideals of responsibility and habits of accomplishment which will reach to, and affect, after-school activities. The most important prerequisite of a problematic assignment is a thorough knowledge of the subject-matter. A thorough organization of the subject-matter should precede any attempt at a serious assignment.

It is quite as important that the teacher carefully investigate the preparation of the assignment as that she prepare the assignment. Unrecognized preparations and unacknowledged achievement will generate a feeling of indifference for the subject-matter and a lack of confidence in the teacher.

Some teachers prepare good assignments for their pupils

with the express purpose of keeping them busy during the study period and then proceed to present new material during the recitation period. This practice is based upon the fallacious belief that it is wasteful to take the important time of the recitation period to consider what the child has already attempted to acquire.

In the first place, the normal pupil will not continue long to get the assignments with any degree of zest and comprehension if no consideration is given to what he has accomplished. In the second place, it is erroneous to assume that an assignment worthy the mettle of pupils will be *mastered* in the preparation. In the third place, this practice overlooks the fact that ability to acquire knowledge is much more valuable than knowledge itself. This ability can be nurtured best through a careful checking up in the recitation or by individual supervision and not by mass teaching.

Value of Voluntary Contributions

Mere routine and a lock-step stifle the elements of leadership. Differences and not likenesses in children form the background of truly worthy characters. The school is duty bound to develop worthy variable traits.

Individual Reports. — Frequent opportunities for pupils to make contributions from supplemental sources should be offered. Incidentally these contributions enrich the knowledge of the class. Their greatest value, however, is for him who makes the contribution. The glow of satisfaction, the increased self-respect, the sense of reliability, become indelibly fixed in the personality of him who makes the contribution, provided it is *worthily done* and graciously appreciated. Any other result has a

negative effect so far as establishing responsibility is concerned.

Optional Work. — A wide variation in the abilities and attainments of children makes optional work an essential factor of effective teaching. Since all pupils cannot go the same pace, it is important that some special provision be made which will insure a maximum accomplishment for each. In well-regulated schools this condition is provided for by adjusting the assignment to the average ability of the class and then providing special aid for the weakest of the group, and optional work of a supplemental character for the unusually gifted children.

With all of its defects the country school of a quarter century ago was strongest in caring for the unusually gifted children. These were given great freedom in thought, in rate of accomplishment, and in the materials assigned. The graded system with all of its improvement has decidedly narrowed the range of opportunity of the gifted child. Supplemental provisions, such as optional work, must be introduced to restore these opportunities for maximum development.

To be effective, optional work should not be merely incidental or "busy work." It must be an organic part of the school program. It should feature in both the assignment and the recitation with as much prominence as does the regular work of the class.

Those who are trained by consistent daily procedure to accomplish what is a master-effort for the majority and to assume responsibility for additional subject-matter cannot escape the traits of character which make for leadership, with all its implied responsibility. Professor Whipple's investigations of the gifted child show con-

clusively the teacher's responsibility to the most gifted of the class.[1]

Experimental Work. — Constant acceptance of the utterances of textbook writers and teachers, by pupils, slowly but surely develops a servile dependence which negatives the underlying factors in responsibility.

Genuine experimental work will engender independent habits of thinking and thereby establish in the pupil a wholesome confidence in his own ability to evaluate the situations which confront him. Recent work in nature-study, agriculture, cookery, dressmaking, millinery, including design in both the fine and applied arts, is of a wholesome experimental character.

It is not so important from the standpoint of responsibility that this experimental work produce skill in experimentation as that it produce experimental ideals and individual confidence. Unfortunately the school has fostered an enormous amount of docility. Traditional habit often dominates the procedure of the classroom in this connection and makes it difficult to enter an experimental wedge. This difficulty is being gradually overcome and there is hope that the readjustment occasioned by the World War will accelerate the forces which are overcoming it.

Social Approval a Means of Responsibility

Examples. — The social instincts in a highly civilized society are often stronger than the individualistic instincts. Examples are legion of individuals laying down their lives for principles upon which the security of society depends.

[1] *Classes for Gifted Children*, Whipple. School and Home Publishing Company, Bloomington, Illinois.

The United States entered the World War for no less a reason than this. The American soldiers and their comrades of the allied countries demonstrated the dominance of the social instincts over the individualistic, when unusual conditions prevailed.

One will not consistently and forcibly exert energy in the realization of some end unless he has some assurance of winning. Few, indeed, will continue long a losing game. An effective way of energizing the work of the classroom is to make the pupils win. Strong pupils are conscious that they are winning and for that reason their work is easily motivated. Weak pupils suffer most from this neglect. It is hardly conceivable that a pupil can keep a strong heart for his work when he fails to get the assignments and when subjected to the criticism, and often the punishment, which results from failure. Neither can he be expected to have a wholesome attitude towards his work when his reports show that he is to be held back while his more successful comrades go forward. It requires a stalwart soul to keep up good cheer and to retain intellectual keenness under such conditions. It is unfair to expect the weaker children of the class to do it.

Pupils Want to Win. — Each child in the classroom must be made to win, if he is to be kept in a wholesome learning condition. First of all he must receive the unstinted approval of his teacher. *His success must be judged in terms of his ability to do.* It is the duty of the teacher to see to it that he does some things — many things in fact — which are complimentary to him. It is due him that he know the teacher appreciates his success. Many a class with a record for stupidity and indifference has been stimulated to brilliant achievement by a teacher capable of

showing a *gracious appreciation of worthy effort*, regardless of its absolute merit.

Consistency is a jewel in this connection. Appreciation should not be made cheap or promiscuous. No sensible adult cares for the effervescent and indiscriminate compliments of an injudicious and impulsive person. Pupils are quite as sensitive as adults in this particular. They ignore and often resent cheap, sentimental, and unwarranted appreciation. On the other hand, they long for the appreciation their effort merits. Such appreciation is due them, and when given energizes the entire work of the schoolroom.

School Agencies Which Offer Opportunity to Win

Many school practices afford concrete opportunity for pupils to win the approval their success merits. Dramatization in its various forms is an opportunity of this sort. For this reason it is an excellent motivating device for reading in the lower grades. In like manner it is effective when used in connection with the work in civics, literature, history, and arithmetic; indeed in any subject which lends itself to demonstration.

Exhibits. — When rightly conducted, exhibits are stimulating educational agencies. They offer opportunity for social approval and thereby afford an impetus to greater application. This applies especially to effort in habit formation and the products of skill. It does not apply to phases of school work which deal with thought processes. Form lends itself to exhibition, content does not. The form side of arithmetic and geography can be improved by exhibits. It should be borne in mind, however, that in-

judicious exhibits of work in these subjects will materially weaken the thought processes involved. Formal subjects, such as writing, gymnastics, music, sewing, cooking, manual training, painting, and the formal aspects of other subjects, are wonderfully improved by frequent exhibits of the work completed. Such exhibits not only energize those who prepare them, but they force comparison and consequently result in enriched generalizations.

Supplementary reports and optional work have been discussed as direct agencies of responsibility. They also afford special opportunities for pupils to win distinction of a wholesome sort. This opportunity should not be denied those who can take advantage of it.

Provision for Classroom Materials. — One of the finest forms of service is offered in this connection. Supplemental materials needed to develop the various subjects are referred to here. It may be some rare historical or geographical specimen, vegetables, grains, flowers, insects, implements, books, maps — in fact anything that is needed to supplement the materials presented by the school. Supplying these needed materials offers special opportunity for individuals to win and through the winning to gain in confidence and self-respect.

Definite Class Approval. — Entirely too infrequently, opportunities are given for the class as a whole to put its stamp of approval or disapproval upon the work of some member of the class. A pupil cares far more for the unqualified sanction of all of his comrades than he does for that of his teacher. Yet how infrequently are opportunities offered for a specific expression of the class on the merit of the work done by its individual members.

One of the best ways of stimulating interest in formal

work is through a vote of the class on the relative merit of the work of each member. This form of estimating work forces a sharp comparison of the work at hand. A pupil whose work receives no votes is likely to scrutinize quite sharply that of his associate who receives twenty or twenty-five votes. He will be more susceptible to suggestions of ways to modify his work when he desires to merit the consideration received by the work of a comrade. Teachers who have not used this method of evaluating results will be surprised at the wholesome effect it has.

Topical Recitation. — The topical recitation, though weak in many respects, has at least one redeeming feature. It is admirably suited to establish a sense of responsibility. The pupil must decide upon the amount and quality of the information he needs in order to treat properly the topic assigned to him. He knows that the eyes of his comrades will be upon him. He knows too that his comrades are able to judge his recitation by comparing it with those of the other members of the class. This method in the grammar grades and the high school furnishes a powerful motive. It is akin to that provided by a place on a literary program, a club program, or a commencement exercise. If adequate opportunity is given for considering the merit of the reports it will add decidedly to the motive aroused.

Some Forms of Blackboard Work. — The school will never go back to the excessive blackboard work of two or three decades ago, because of the dust, the noise, the time wasted, and the increased opportunity for distractions of all sorts. There is, however, a splendid side to blackboard work, which makes a judicious use of it exceedingly meritorious. This phase of the work is stressed in geometry especially,

and in other forms of mathematics. It should have a larger place in other subjects.

It is exceedingly exhilarating for one to realize that a definite responsibility, deepened by the presence of the class, is on his shoulders. Such a responsibility is afforded one by blackboard work when it deals with problems which tax the energy of his classmates. Distractions of blackboard work can be materially reduced by reducing the number sent to the board. Provision should be made for the other members of the class to remain at their seats. Type exercises should be worked on the blackboard. Other exercises expressive of the type may well be worked on tablets at the seats.

Negative Incentives and Incidental Agencies and Devices

In the chapter on emotional controls reference is made to the *pull* and *push* of stimuli. In this connection we may think of them as positive and negative incentives. Those referred to above are positive in character. Positive incentives lead to an attitude of investigation and research, and to a grasp of the fundamentals of subject-matter. Negative incentives act as a whip upon the pupil and consequently prevent the fervor which should accompany investigation, and dampen the ardor for a greater mastery of knowledge for which there is a feeling of positive need.

In spite of their *relative inferiority*, negative incentives must be employed until more is known of the teaching process. Even the most inspiring teachers find it inadvisable to abandon all of the "whips" which have been handed down the ladder of tradition. Oral and written periodic tests are still used to advantage by most teachers.

They lead the pupil to see that he must "make good," that he must retain enough of the facts in his course to satisfy the examiner. He takes notes, reviews, and compares his possessions with those of his classmates to insure his being able to meet the minimum requirements of his teacher. This caution on his part will not give him a greater relish for the subject-matter, but it will stimulate a more accurate mastery of the facts considered. These facts in turn may increase his interest in the subject itself.

It may be necessary in an extreme situation to keep a daily record in class of the work done by each member of the class, though it is indeed a rare situation which warrants it. Such a practice is a reflection upon the teaching ability of him who resorts to it. It is distressing, indeed, to see a teacher recording what he thinks the various recitations are worth. It is a strange drama being enacted. It would seem tragic were it not for its comical aspect. It may be necessary for a relatively good teacher to resort to it, but it should be of short duration, and should be the occasion of professional embarrassment.

Formal Reports to Parents. — Reports to parents may act either as a positive or a negative incentive. Occasionally pupils are stimulated by the appreciation they expect to receive when the report reaches home. Unfortunately, however, report cards more frequently serve as whips than pulls, and consequently are negative incentives. They have further administrative functions which need not be considered here, and which may justify a judicious use of them.

Definite Schoolroom Requirements. — Responsibility subjectively considered is an aspect of character in which habit plays a large part. For this reason school manage-

ment is no small agency in establishing responsibility. An insistence upon punctuality alone often stimulates initiative, requires premeditated and systematic planning, and often secures a readjustment of old ways of living by a willed program to overcome physical inertia and social and economic irregularity.

Working in unison with the social unit of which one is a part, even if it is a response to external requirement at first, ultimately has a wholesome effect. It awakens and enlivens a sense of social responsibility.

Positive and not negative means should be employed first to remove tardiness as an obstacle to class unity. An intellectual appeal to cease being tardy may result from a careful estimate of the waste time forced upon the school by the distractions occasioned by a late comer. In a school of forty it is reasonable to suppose that the lost time occasioned by a late comer is on the average two minutes per pupil, or an equivalent of eighty minutes for one pupil. Since this is one-third of a pupil's daily study time it is clear that six tardies per day represent an actual educational loss equivalent to the absence of one pupil from school all of the time.

An appeal to class pride secures wonderful results. A little rivalry with other grades and other schools gives a wholesome impetus to punctuality. It immediately puts the tardy pupil in a position of offending the class and subjects him to the condemnation of his associates. Few pupils are so non-social as to deliberately ignore this social pressure of the class.

A high school which was notorious for its poor habits of attendance was practically cured of this ailment in a brief time by a class-coöperative scheme. A general

plan was inaugurated whereby a wholesome rivalry between classes was sanctioned. A number of points were given for success in the various forms of gymnastics, music, public speaking, general scholarship, and habits of attendance, including punctuality and full time attendance. The last two items were given more points than the others for obvious reasons. The successful class was awarded a prize by the school, which in turn it gave to the school with its insignia upon it.

The classes were not slow to see the effect of scholarship and punctuality upon the final outcome. The classes of poorest scholarship and most likely to be irregular at school were first to recognize that punctuality was more vital to them than to those of greater scholastic tendencies. Class meetings were held and the transgressors in the several classes were told in no uncertain terms by their associates that they must mend their ways in order to remain in good standing with the class organization and with the individual members composing it. The results were splendid.

There are some weaknesses in a motivating device of this sort. It is meritorious in that it increases and intensifies the group consciousness and thereby tends to subordinate the self to the welfare of the group. Such consciousness and subordination are the essence of the responsibility needed in a democracy.

Pupil Organizations. — From the standpoint of leadership nothing the school can do is more helpful than well-supervised pupil organizations. They impose a degree of self-direction unobtainable in the classroom. Opportunities are legion in this connection. A little encouragement, proper supervision, and adequate safeguards for the pre-

scribed work of the school are all that is necessary to make it a success.

In a large high school there should be enough of this sort of activity to justify a supervisor who will give all of his time to directing these extra schoolroom enterprises. Certainly they are no less educative and far-reaching in their influence than other work now receiving the entire time of special supervisors.

Standardized Tests. — Standardized tests have not a little bearing upon individual responsibility. A consciousness on the part of the pupil, that his relative standing does not depend upon the biased judgment and the prejudices of his teacher, but upon an impartial comparison of his success with the average success of a large and widely distributed group, leads him to begin the process of self-evaluation, which usually results in a better perspective, a stronger reliance upon his own resources, and a more intelligent direction of his own schoolroom activities.

CHAPTER X

VALUE AND CHARACTER OF EFFECTIVE STIMULI

The Use of Stimuli. — The only contact which the embryonic consciousness of the child has with the outside world is through a complicated nerve system which terminates in the special senses. The character and variety of contacts which these special senses have with the environment determine in a large measure the development of this embryonic consciousness.

In the early stages of the child's development there is no attempt on the part of his elders to systematize the stimuli which he receives. The contacts which he has are incidental and unorganized. Like the butterfly, he attends to one stimulus after another, each in turn producing intense but momentary rapture. He is yet unfamiliar with organized games.

After a little while the development of the play instinct tends to stabilize and systematize his conduct. He now finds pleasure in doing a thing many times. The little games which he plays to satisfy these instincts require repeated attention to the things of his experience. This repetition of sensation enriches his percepts and lays the foundation of the fundamental habits.

Again, the environment of the home, to which the child is exposed, provides the first systematized stimuli of his

experience. Unconscious of any definite results, he submits to regular times for eating, sleeping, and exercising. He observes the character and use of the various articles of the house and is gradually trained to adapt himself to the conventions of the home. These early home contacts begin to organize his life in harmony with his later needs.

Many of the stimuli of the home are consciously directed by those in charge, in an attempt to determine the life attitude of the child. In some homes these stimuli are consistently and systematically directed with excellent results. Imitation, however, plays the largest rôle in the home management of children. It is unfortunate that legitimate aims of home management and the most effective means of attaining them have not been agreed upon and popularized. Educational leaders, like physicians, seem possessed with the notion that "home remedies" are dangerous. Home remedies will and should be used. There should be a common agreement as to which remedies are most effective.

Not until the child reaches the school is there a consistent conscious effort to determine his contacts in the light of the demands society will make upon him. Here certain specific aims are established and materials selected. Through bringing him in contact with these materials it is expected that he will realize the aims which are held up for him. An important function of teaching is to bring the child into a wholesome understanding with these materials. This means adjustment, adaptation, amplification. It means an employment of those teaching devices which are known to be effective. One chief difficulty involved in preparation for teaching is a mastery of the stimuli to be used.

Classes of Stimuli

Concrete Stimuli. — Before entering school the child has had a relatively rich experience with concrete stimuli. He has had first-hand experience with the animals, plants, minerals, and the inorganic matter of his environment. A fairly good stock of concepts has resulted from these sense experiences. It is part of the business of the school to enrich these concepts, to form new ones, to develop fundamental generalizations, and to give the pupil a mastery of their appropriate symbols.

Unfortunately, the teacher too often assumes that the child's out-of-school contacts have been ample. Consequently he proceeds to give much of the time to teaching symbols and to enriching the content of these symbols.

First-Hand Experiences. — Many of the child's concrete experiences have been wholly inadequate, due to lack of proper incentives. Many a boy reared on a farm and in the midst of wild flowers and insects knows little or nothing of them until his first real acquaintance with them in the classroom, where properly set problems give specific direction to his energies. What and how much one sees depends in a large measure upon what his problems are. So far as the solutions of out-of-school problems have determined the child's sensations, it is reasonable to suppose that his sense experiences have been adequate.

It is the business of the school to inquire into these out-of-school experiences. When defective it should set up problems, the solutions of which require a careful examination of concrete materials.

Important as concrete objects are, they usually fail to arouse a sufficient response on the part of children to in-

sure vivid sensations, until they become a necessary means of solving the pupil's problems. Materials brought into the classroom for incidental observation, unless they are of an unusual nature, will result in relatively poor attention owing to the lack of a specific motive.

Concrete objects to be of most worth should be used as a means to an end and not as an end in themselves. When examined to justify some opinion or to secure some desired information the impression of them is much more complete and lasting. When thus employed, supplementary materials in nature study, biology, the physical sciences, mathematics, geography, and history are wonderfully effective in the learning process.

Illustrative Materials

Maps. — Second to real materials are those of the illustrative type such as maps, diagrams, graphic illustrations, and models. Perhaps the map is the most significant and widely used of these. As a rule it is not poverty so much as low ideals that prevent a free use of maps. A recent visitor to a country school in Illinois approached a map case attached to the wall. Surrounded by several children he proceeded to pry the case open. Finally he drew down a long imprisoned map, which brought the following exclamation from one of the pupils: "Oh, that's what's in that thing!"

It is this indifference to the value of maps in the teaching process that makes the situation most discouraging. Young teachers as a rule neglect to use maps freely. Even when the map is used, lack of comparison and detailed observation rob this device of much of its merit.

Proper Use of Maps. — To be used freely maps must be

in good workable cases and placed where the light is good. When the map is to be used in the recitation it is usually best to *pull it down* before beginning the recitation, though it may not be needed until the latter part of the recitation. Too frequently pupils refer to a map in an incidental way. Occasionally a child will condescend to approach it and with a quick wave of the hand point in an indefinite way toward the place under consideration. It is rare indeed that one sees a grade pupil approach a map and with the hand or pointer carefully trace the boundary of a territory, the course of a river, or the route of an army. It is such a detailed use of a map as this that really counts, both for the one who does it and for those who observe.

Diagrams and Illustrations. — Nothing reveals a teacher's mastery over the teaching process better than an intelligent use of diagrams and illustrations. When a situation is somewhat obscure, a graphic or verbal illustration will touch the obscure spot or center of confusion. When political parties want to impress the select voter with their merit, they call upon noted cartoonists to portray it in graphic form. They send into the field those speakers who have the ability to portray the party's merits with simple, homely illustrations. Lincoln was a "past master" at illustration; and Mr. Bryan, who doubtless has addressed more people than any other American statesman, uses concrete illustrations most effectively.

Explanation tires and irritates one who vaguely understands a situation or a principle. An *illustration*, on the other hand, has the opposite effect. Its individual aspect interests, while its concreteness offers opportunity for further comparison and richer generalization. Yet how frequently does one see a teacher, worked up to the "third degree" of

intensity, "chattering like a magpie" in her attempt to explain a situation which is unexplainable because the words employed have no content to the confused pupils.

The Use of Models. — There has been not a little discussion of the relative use of the model as a teaching agency. Strange to say the end of the discussion is not yet. Some maintain strongly that type compositions will aid materially in improving the compositions of children since, as they argue, language usage is largely a matter of imitation. Others as strongly maintain that the model is too far removed from the pupil's experiences and consequently fails to make a strong appeal to him. Those of the latter school prefer to compare the compositions of the pupils and thus arrive at those qualities of composition which express thoughts and feelings most effectively.

Doubtless both methods are valuable. It depends entirely upon their order. After fundamental principles of discourse have been derived by means of comparison, it will add much to the inspiration and confidence of the children to find that a writer of note has recognized the same principles and used the same form they have found effective in conveying *their* thoughts.

Models in other subjects are scarcely more appreciated than in composition. There is a strong demand for initiative and originality. A student of cookery is encouraged to experiment with materials until she can make a recipe for herself. Each girl in a sewing class is taught to design her own dress. Similar methods are employed in manual training. The whole trend of teaching is to stimulate originality in both thought and expression. This freedom of the pupil should be safeguarded by properly establishing the fundamental habits of life.

Again without loss in individual initiative, individual research may well be evaluated in terms of a generally accepted model. The results of experimentation in the cooking class may well be subjected to a sharp comparison with those secured from the use of a standard recipe. The same will hold true for the products of the sewing room and those of manual training.

But more especially, models are of real value in the primary grades. A model room from the standpoint of attractiveness, model English and model writing on the part of the teacher, are valuable innovations. In fact school conditions in this early period, only when most wholesome, are worthy of imitation. They should be models in the finest sense of the word.

Formal Methods of Presenting Subject-Matter

The child early expresses himself through symbols. At first spoken, then printed and written language are employed to convey ideas to and from him. One large phase of school work has to do with the teaching and interpretation of symbols. Another large and significant phase involves the teaching of new knowledge through the direct instrumentality of language itself. Indeed, most school work deals with knowledge which has been acquired through the instrumentality of language. On the basis of the use of language as a teaching agency, methods of teaching are divided into classes.

The Textbook Methods. — The direct use of the textbook in getting knowledge and inspiration is common. There is no indication at present that this practice is to be abandoned even partially in the near future. Textbooks have

so improved, both as to information and method, that they are indispensable to the modern school.

McMurry[1] analyzes textbook usage into three methods. The first requires the pupil to learn the language of the author verbatim, as if it had some magic power. Much of the Sunday-school work has consisted of this method of teaching. Teaching a verbal mastery of definitions in grammar, arithmetic, geography, composition; a similar mastery of propositions and corollaries in geometry; the memorizing of poems and prose — are examples of this form of method.

This method is often both obstructive and destructive. It degenerates into formalism, and often results in the short-circuiting of words. It reduces the teacher's responsibility to the minimum. It requires little forethought on the part of the teacher to employ the verbal method of knowledge-getting. He need not concern himself with relative values or with the psychic processes involved in getting the knowledge contemplated. An insistent demand for results and enough influence and strength to see that this demand is obeyed seem to be the essential prerequisites to this sort of teaching.

There is no economic, ethical, or æsthetic reason for the verbal mastery of subject-matter until it is relatively well understood by the child. There is enough worthy subject-matter that the child can understand and appreciate without it being necessary to clog his "psychic machinery" with "non-absorbent" materials.

The second method involves that usage of the textbook in which the thoughts of the author are interpreted in terms of the pupil's own experiences. This is the most common

[1] *Method of Recitation*, McMurry. The Macmillan Co.

method of the elementary school. History, geography, and reading especially lend themselves to this method. It is a strong method in knowledge getting and in the development of language. It is weak in that it does not stimulate sufficient initiative or lend itself to a sufficient development of sound judgment.

For mature students who have already raised vital problems for themselves to solve and who are comparing the judgments of textbook writers as a means of solving these problems, this method is effective. Whenever the teacher can keep vital problems before his children, which require an examination of the materials in the text for their solution, this method is an effective teaching agency.

The third method is concerned with that usage of the textbook in which the thoughts of the author are used as a basis of free discussion, with no attempt on the part of the teacher to accept the author's conclusion as final or even vital. This higher criticism leads to independence of thought and to a comparative study of many viewpoints. No work that the school does is more stimulating than this. Here again definite aims are necessary to give balance and sane direction to the work at hand. Unless this method-form is surrounded with adequate safeguards, it may result in mere quibbling, endless discussion, and deceptive generalizations. Textbooks, like other instrumentalities of life, are valuable only in so far as they are rightly used. When properly used they are of inestimable value in the teaching process. When wrongly used they develop mental inertia and thwart the realization of social aims.

The Lecture Method. — Many believe that the serious

conditions which have resulted from an improper use of the textbook method may readily be prevented by the use of the lecture method. The universities have adopted this method largely, and graduates from these institutions who are engaged in teaching have been inclined to employ it.

The arguments in its favor are many. The responsibility it imposes upon the teacher, the inspiration of the teacher's personality, the close sequence of thought, the special adaptation of the subject-matter to the needs of the particular group at hand, are some of the arguments of its advocates.

Its relative merit depends upon the conscious needs of the pupils. If those who are lectured to have raised important problems for themselves to solve, if the lecture bears directly upon these problems, and if the lecture is adapted to the interpretative ability of the pupils, there can be no doubt of its effectiveness. Under these conditions it is the most economical method available. Graduate courses in the universities, courses for teachers in service, in fact for all teachers with definite problems to solve, may be given best by the lecture method. When these conditions do not exist, lecturing is by no means the most effective method of presenting subject-matter.

The Development Method. — Efficiency in teaching has been impaired in places by a literal application of the development method. A superficial study of child psychology has caused an undue appreciation on the part of teachers of the initiative and self-direction of children. Many disciples of the development method have felt that it is the child's inalienable right to discover all truth by the process of "intensive thinking." They have proceeded,

therefore, by this method to "draw out" or develop the latent abilities of the child.

By means of questions, mainly, the child's experiences are recalled and related to the new situation at hand. Two harmful practices have developed from the overzealousness of the advocates of this method. Frequently they try to develop what the child already knows, or what is not worth the time and trouble expended, or what cannot be developed. Again they try to "pump water from a dry well." This often occurs in connection with the acquisition of definitions and the explanations of principles. Usually the child needs more experiences that are rich in the fundamentals involved, as well as an awakening of those he already possesses, instead of principles and definitions.

As a supplementary agency, a cautious use of the developing method results in all that is claimed for it even by its most enthusiastic advocates. Its successful employment requires an artful use of the question and a keen sense of relative values.

Classroom Questions

On the basis of form, questions fall naturally into four classes: the direct question — Are you old enough to vote? the indirect question — Why does water run up hill in a vacuum? the alternative question — Was Ohio the first or second state formed from the Northwest Territory? and the elliptical question — $3 \times 6 =$ ——? The fourth president of the United States was ——?

The Direct Question. — It is evident that the relative teaching value of these questions depends upon the use that is made of them. The direct question so frequently used to provoke thought is a failure in this connection.

A pupil has a fifty per cent chance of giving the desired answer without doing any thinking whatever. When the question is supplemented, as it frequently is, by a suggestive intonation, a modification of the voice, and a significant look of the eye, the chance of giving the desired response has reached almost to a point of certainty. Frequently pupils develop a rare keenness at guessing the answer the teacher wishes given. This form of the question is effective when information alone is desired. It does not provoke thought.

The Indirect Question. — This question is the most common and most effective one employed by teachers. It reduces guessing to a minimum and thus paves the way for responsible thinking. In like manner it imposes upon the teacher the necessity of knowing the underlying principles. One cannot consistently ask effective indirect questions without a thorough understanding of the intrinsic function of the parts of the subject-matter. The first prerequisite to effective indirect questions is a thorough understanding of the main purpose and the logical structure of such subject-matter.

The Alternative Question. — There is not a large use of this question in the teaching process. Neither is it an effective tool. It stimulates guessing and but seldom provokes thought. The situation is rare indeed which demands its use.

The Elliptical Question. — The elliptical question has a real place in teaching. It is especially valuable in drill work in arithmetic and for similar purposes elsewhere. Children's books frequently contain many elliptical questions. They appeal to the child's sense of curiosity. They also indicate briefly what is to be found.

In the main, the *indirect question* should be used in assignments, examinations, and in the daily recitation. An organization of subject-matter is a prerequisite to an effective use of it. Ability to organize is fundamental to thought-provoking questions.

CHAPTER XI

THE VALUE OF COMPARISON

Comparison is so vital, and its inadequate use so serious that there can be little danger of overstressing the importance which McMurry and others have given to it, by a further and somewhat detailed treatment of its natural, fundamental, and practical aspects.

Comparison a Natural Process. — Comparison is a natural process, since it is a vital factor of both work and play. The play activities of children and adults are constantly stimulated by comparison. The competitive element, which depends upon comparison, prevails in running games, marbles, sling, quoits, tenpins, tennis, ball, golf, and racing of every sort. The sharper the comparison the more exhilarating the game. Few persons indeed enjoy playing with an unworthy competitor, and seldom does an audience enjoy a one-sided contest. Eliminate the element of comparison and the game ceases to be.

In like manner the impetus to work results from the satisfaction which springs from a comparison of a past or present real with an ideal, partially or wholly within the scope of realization. The impetus to mow the lawn, other than that secured by external pressure, springs from the satisfaction experienced when the well-mowed lawn is held in imagination alongside the image of the existing lawn and evaluated in terms of social approval, personal

convenience, or enjoyment. One paints the house, sods the yard, repairs the fence, curries the horse, and "rubs down" the automobile, because of the satisfaction that results from a comparison of the real with the ideal.

Fundamental to Vigorous Thought. — Not only is comparison natural as revealed in an analysis of both work and play, but it is fundamental to vigorous thought processes. The raising of problems is as fundamental to good teaching as the solving of them. We appreciate most those authors who throw bombs along our mental pathways — who make our satisfied and comfortable opinions unsatisfied and uncomfortable. We appreciate most those books and articles which undermine our prejudices, clarify our superstitions, and broaden our perspective.

In like manner we revere those teachers who provoke new views, stimulate new attitudes, lead to new conquests, and arouse in us a confidence which we once thought ourselves incapable of. Comparison is an effective means of raising problems. No more stimulating approach to a new situation can be made than that of comparing it with an old one with which it has some elements in common.

The biologist recognizes this truth. He approaches in turn increasingly complex specimens by comparing them with the simpler evolutionary forms. Through similarity and contrast a structural relation between the great groups of animal and plant life is established. It is the educational value of this thought-provoking approach which causes some biologists to question the merit of a general science course which apparently is of a less coherent character.

A thought-provoking approach to a study of both South Australia and Argentina may be made by raising the

following comparative problem: Why are corn raising in Illinois, sheep raising in South Australia, and cattle raising in Argentina respectively the predominating agricultural industries of these states, though all are in a similar latitude? The solution of this problem involves a knowledge of the comparative amount and distribution of the rainfall and an understanding of the prevailing winds, surface features of each country, remoteness from large bodies of water, internal improvements, etc.

Comparison of Subject-Matter Provokes Thought

Method in History. — The materials of history lend themselves to effective comparison. No better illustration of the efficacy of comparison in provoking historical mindedness can be given than Fiske's *Critical Period in American History*. This account is brilliant and effective, because of its masterful comparisons. The motives and policies of statesmen, the character of colonial governments, their chartered holdings, nationalities, industries, tariff laws, and a multitude of other factors are paraded before the reader and compared for purposes of accounting for the political structure which sprang up in the latter half of the eighteenth century from the varied and complex situation which immediately preceded it. Other historians may have examined more source materials, and contented themselves with less philosophizing, but all must respect John Fiske for his splendid style, which is characterized by its frequent and effective comparisons.

Method in Nature-Study. — Method in nature-study, because of the newness of the subject, and because of its kinship to the natural sciences, is more comparative than that of many of the older subjects. Our annual corn

shows, seed tests, and vegetable and flower exhibits are comparisons of merit. Never, however, until comparison in nature-study and in the sciences includes fundamental processes and their results can we hope that children will become possessed with a scientific bent for nature.

A course of study in elementary science, it matters not how adequate it may be, will accomplish little until teachers become saturated with scientific ideals and possessed with scientific knowledge. The situation can be decidedly improved under present conditions by introducing departmental work in the upper grades, and by substituting vertical or departmental supervision for the transverse or general supervision now in vogue.

Method in Teaching English. — It has been declared recently in some quarters that the waste in the processes employed in the teaching of English is more marked than in the teaching of any other subject. When we consider the results of four years of high-school English in specific courses, not to speak of the correlated English through the elementary and secondary schools, we are inclined to believe that the declaration is true, especially so far as it applies to the teaching of composition.

The faithful marking of relative errors and the *casual discussion* of these when the papers are returned, is too indefinite and void of emotion to produce a decided improvement. Fewer compositions and more effective comparisons will improve the situation. Rotary mimeographs and projectoscopes to afford proper comparison are as fundamental to the effective teaching of composition and rhetoric as microscopes and hand lens are to the teaching of biology. The comparative method afforded by such an equipment is as superior to the common method of dis-

cussing isolated compositions after they have been read to the class as the automobile is superior to the family carriage.

Comparison Increases Literary Appreciation. — Literary appreciation is no less enhanced by comparison. The excessive use of the moral that was tacked on to the old fables has tended to establish a strong prejudice against emphasizing analysis in the study of English. We hear sensitive natures proclaiming: "Analysis savors of vulgarity, and prevents the deeper and more universal qualities of the soul from reverberating to the gentler and subtler stimuli which radiate from truly great pieces of literature."

If the intellect needs to be throttled in order that literature and painting be most highly appreciated, doubtless we are to conclude that the peaceful and contented appearance of dumb animals is due to their high appreciation of the poetry of nature.

It is reasonably sure that but few of us need be seriously alarmed over the excessive discoveries of our intellects. The intellect is the greatest heritage of the animal world, and there is no serious reason why one should not use all he possesses in the study of art and religion, as well as in the study of industry and science. Comparison is a positive indication of intellectual activity. It stimulates emotional activity as well.

A striking similarity of function is laid bare in the comparison of Longfellow's *Excelsior*, and Jordan's *Life of the Salmon*. Both structures reveal conduct that is controlled by an inherent and impelling force. Jordan reveals the instinctive force which impels self-preservation and the provision for offspring in lower animals. Longfellow pictures the impelling force which drives superior

human beings on to marked achievement. There is a wonderful similarity in the function of these seemingly widely different structures. A comparison of the two selections enriches our appreciation of the splendid adaptation of the structures to the all-pervading idea of each.

A comparison of Tennyson's confession of faith expressed in his *Crossing the Bar*, with Browning's confession of faith set forth in his *Epilogue to Asolando*, reveals in a significant way the temperaments and the philosophies of these master artists. Tennyson expresses his faith thus:

> "Twilight and evening bell
> And after that the dark;
> And may there be no sadness of farewell,
> When I embark.
> For tho' from out our bourne of
> Time and Place
> The flood may bear me far,
> I hope to see my Pilot face to face
> When I have crost the bar."

Contrast this quiet and peaceful faith of Tennyson, accepted of his fathers, with Browning's:

> "No, at the noonday in the bustle of man's work time
> Greet the unseen with a cheer.
> Bid him forward, breast and back as either should be,
> Strive and thrive! Cry speed, — fight on, forever
> There as here."

The faith of each is determined by his experience. That of Tennyson is gentle and submissive. That of Browning is vigorous and springs from life itself. Tennyson "wraps the draperies of his couch about himself and lies down to pleasant dreams." Browning girds his loins for greater conquests.

Keats's *The Human Seasons* becomes more and more interesting when compared with Shakespere's *Seven Ages of Man.* Shakespere, who wrote first, speaks his notion of the evolution of the individual through the mouth of Jaques thus:

"All the world's a stage,
And all the men and women merely players:
They have their exits and their entrances;
And one man in his time plays many parts,
His acts being seven ages. At first, the infant,
Mewling and puking in the nurse's arms.
And then, the whining schoolboy, with his satchel,
And shining morning face, creeping like a snail
Unwillingly to school. And then, the lover,
Sighing like furnace, with a woeful ballad
Made to his mistress's eyebrow. Then, a soldier,
Full of strange oaths, and bearded like the pard,
Jealous in honour, sudden and quick in quarrel,
Seeking the bubble reputation
Even in the cannon's mouth. And then the justice,
In fair round belly with good capon lined,
With eyes severe and beard of formal cut,
Full of wise saws and modern instances;
And so he plays his part. The sixth age shifts
Into the lean and slippered pantaloon,
With spectacles on nose and pouch on side;
His youthful hose well saved, a world too wide
For his shrunk shank; and his big manly voice,
Turning again toward childish treble, pipes
And whistles in his sound. Last scene of all,
That ends this strange eventful history,
Is second childishness and mere oblivion,
Sans teeth, sans eyes, sans taste, sans everything."

Keats, much less analytically and much more beautifully, expresses himself thus:

"[Man] has the lusty spring, when fancy clear
Takes in all beauty with an easy span:
He has his summer, when luxuriously
Spring's honey'd cud of youth he loves
To ruminate, and by such dreaming high
Is nearest unto heaven: quiet coves
His soul has in its autumn, when his wings
He furleth close; contented so to look
On mists in idleness — to let fair things
Pass by unheeded as a threshold brook:
He has his winter, too, of pale misfeature,
Or else he would forego his mortal nature:"

Keats dwells upon subjective divisions while Shakespere portrays in the main the physical complement of these. The analysis is not quite so sharp in *The Human Seasons* as in *The Seven Ages of Man.* On the other hand, the more subtle and fundamental emotions are portrayed in *The Human Seasons.*

No one is so foolish as to maintain that it is the function of all literature to reveal fundamental truths. However, it is inconceivable that one should create a "literary gem" without forethought and purpose. These purposes may vary, from those which determine a series of word pictures, harmonic and rhythmical sounds, various emotional conditions, to those which deal with great fundamental principles. There is no way of knowing what was intended except through an analysis of the structures created. There is no better way of finding the relative effectiveness of structure to reveal its function, than that of comparing it with those intended to reveal a similar function.

Comparison Clarifies Thought. — Not only does comparison provoke thought, but it clarifies it as well. One's vague notion of the social and economic conditions of

colonial days may be clarified by a comparison of the fundamental phases of that life with the fundamental phases of his own. A comparison of the houses, furniture, methods of lighting, heating, cooking, travel, transportation, pastime, forms of etiquette, and the conventions of those times, with those of to-day, will remove many of the absurd notions we may have of colonial life.

One will understand and appreciate human purpose and effort, the products of toil, the adequacy of knowledge and training, the sanity of styles and fashions, the soundness of judgments, and the worthiness of motives, by comparing them with those which have stood the test of time. Vagueness and uncertainty are clarified and made certain not by complicated and extended explanation, but by sane and adequate comparisons.

Comparison Stimulates the Memory. — Comparison not only provokes and clarifies thought, but it stimulates and strengthens the memory. Jones[1] and Pearson[2] have demonstrated that correct forms in spelling are held more tenaciously when they are taught by comparative methods than when presented in isolation.

We can retain with greater certainty the normal yield of wheat of the great wheat-producing countries of the world by a comparative study of their production. Through comparison we more easily remember that Russia and the United States each before the World War produced in round numbers 700,000,000 bushels of wheat annually, that India produced one-half as much, while France and Austria-Hungary before the war each yielded slightly more than one-third that amount.

[1] In an unpublished report by W. Franklin Jones.

[2] Henry C. Pearson, *Journal of Educational Psychology.* Vol. 2, 241.

Most eighth-grade children have little control of the facts relative to the sugar products of the world, since the yield of each country was learned in isolation. When, however, it is held up in comparison, retention is easy. A comparison of India's and Cuba's production of 2,000,000 tons of cane sugar each, with that of the United States, which is three-fifths of that amount, gives an accessible latch-string to one's memory. A comparison of the beet sugar yield before the World War ranks Germany first, Russia second, Austria-Hungary third, France fourth, the United States fifth, and Belgium sixth. This comparison at this time is especially pertinent, since it gives one an insight into the prices which now prevail as well as into the relative supply of this food product in the other countries. All facts are vivified, and their relative values emphasized, by comparison.

Illustrations without number can be drawn from the great fields of knowledge to substantiate the efficacy of comparison in the teaching process. Unfortunately certain traditional schoolroom practices prevent its free and most effective use.

Modern Textbooks Employ Comparison. — Textbooks are just beginning to use comparison effectively. Our better geographers are putting comparative diagrams and maps in the back of their books. Some historians are inserting here and there a set of comparative maps in their newer works.

Objective Standards Force Comparison. — No single feature in school administration has been quite so far-reaching in its results as that of employing objective standards in the determination of teaching efficiency. The economic maxim, "put the oil where the squeak is," is being applied

to the teaching process with splendid results. It must be borne in mind that the determination of standards and their application both depend upon a sane use of comparison.

The demand for more efficiency in the teaching process is focusing our attention upon the relative value of teaching methods. It is revealing the fact that we make too little use of what we know, in grasping the unfamiliar. It is reasonably certain that teaching efficiency may be enhanced by giving greater care to the organization of facts already possessed and by comparing these facts with the new materials at hand.

CHAPTER XII

APPLICATION OF PRINCIPLES TO READING

Industries Employ Expert Knowledge. — The scientific advance in the half-century just past has materially influenced every phase of organized effort. The field of industry, especially, has made much of this expert knowledge. Private and public enterprises have increased their output and improved the quality of the finished product. By means of improved methods wastes have been practically eliminated and energy has been conserved.

The meat-packing industry alone exemplifies the marvelous influence that conservation has had in the industries. Under the new régime materials that were once wasted are now converted into useful products. The dirt on the skin of the steer is saved for fertilizer; his hair is made into brushes, cushions, mattresses, and shoddy; his hoofs, horns, and the marrow of his bones yield an abundance of glue; his hide is transformed into leather; his bones are converted into handles for brushes and knives, into hairpins, combs, buttons, and boneblack; his fat yields oleomargarine, soaps, and extracts; while his life blood is carried away to fertilize soils, improve paper, and purify sugar. Moreover, through the touch of science this great industry has materially added to our food and has improved its quality as well.

Schools Must Employ Expert Knowledge. — If applied science can thus enhance the value of the steer it should, when applied to the child, produce results of vastly greater interest. We cannot refrain from suggesting that it is extremely embarrassing to the schoolmaster that he needs to draw his inspiration for scientific teaching from the butchers of hogs and cattle. If it pays to conserve energy through the application of scientific principles in the preparation of foodstuffs, certainly it pays infinitely more to apply scientific principles in preparing the child to meet his social obligations and to enjoy his social heritage. Just to the degree that the various phases of the teaching process are understood and this knowledge is efficiently applied, just to that extent are we applying scientific principles to our teaching.

Every effort for the serious consideration of the worthwhileness of subject-matter and method is indicative of economy in education. With a better understanding of social problems on the one hand, and of psychological principles on the other, we are better enabled to economize in the selection of materials and method. Materials are judged in terms of social standards, and processes are sanctioned to the degree that they ultimately result in a maximum efficiency.

Some Basic Principles

Interest is Valuable. — The doctrine of interest has been long associated with the process of learning. Continued attention without any immediate or mediated interest is, from a pedagogical point of view, an absurdity. One persistently attends to that which has a paramount interest for him and ignores that which makes no appeal. If we

accept either Ostermann's view that "Interest is consciousness of value," [1] or Baldwin's view that it is "The impulse to attend," [2] we have cognizance of the fact that it is an inherent force that at least registers the degree of one's attention, and consequently indicates or determines the degree of mental effort expended.

Wasted Energy is Expensive. — It is a lamentable fact that we have never considered seriously enough the quantitative side of effort. Teachers who pride themselves on the punctuality of their children and on the relatively few absences recorded, often permit recitation after recitation in which there is more than 75 per cent of waste energy. Growth comes from interested application. The more intense the application the greater the growth.

To attend to a stimulus intently, so intently indeed that other stimuli are isolated, insures a high degree of association and a maximum degree of learning for the child so engaged. It is the function of method to create this high degree of attention through the stimulation of strong motives.

In the last analysis our problem, applied to primary method, is to lay bare its *motivating factors*. At the very outset it is apparent that an adequate discussion of this problem includes consideration of both its subjective and objective aspects. To emphasize the former and neglect the latter is to be guilty of mere theorizing, while an emphasis of the latter aspect, only, is indulging in arbitrary assumptions.

Since the responsiveness of an individual depends primarily upon the organization of his experiences, it is es-

[1] *Interest in Its Relation to Value*, Ostermann.
[2] *Elements of Psychology*, J. N. Baldwin.

sential that the teacher have a definite notion of the character of these experiences, and how best to draw upon them. He must distinguish sharply between the function of racial experiences, or instincts, and the function of personal experiences, the elements of which are gained through the senses.

An Appeal to the Instincts is Worth While. — Hereditary control, or instinct, is an animal's inherited organization for converting native impulse into personal experience. Through the functioning of his instincts the child draws upon his environment for his personal welfare. He instinctively cries and his physical needs are supplied. Instinctively he is curious about things and his curiosity impels him to examine them closely. He babbles and imitates and thereby acquires a rich stock of percepts. He compares and discriminates and thus attains concepts or general truths. Bubbling over with curiosity and inquisitiveness, the child presents himself unfettered by social custom, to the care of the school. Primarily, the first duty of the school is to familiarize him with written symbols, increase his oral vocabulary, and enrich his experiences. The extent to which this is accomplished and the way in which it is done mark the success or failure in primary method.

Native curiosity and inquisitiveness must be drawn upon in full measure if learning to read is what it should be. Written symbols furnish little variety in themselves and soon become uninteresting. How can interest be sustained in the mastery and interpretation of symbols?

Expert Knowledge in Primary Reading. — The history of effort in the solution of this problem is the history of primary method in reading. Some of the attempts are

the alphabet method, the word method, the sentence method, the phonic method, including specific action and dramatization. Each of these so-called methods in reading has been abandoned or retained on the basis of motivation. Before attempting to judge each of these methods in terms of motivation it is well to understand the end to which it is employed.

Mark of Successful Methods. — The child's energy is exercised in acquiring both content and form. Any method that is successful in one should not be evaluated in terms of the other. It is just such practices that create meaningless controversies and that tend to emphasize devices until they are popularly spoken of as "methods."

Motivating Factors in Primary Reading

Since the child has a rich stock of experiences on entering school, let us consider those devices that are effective in teaching him a written vocabulary. At first children express their ideas orally. These in turn are given written expression. In a short time a number of written symbols will have been introduced, which the children have not mastered. An automatic repetition of these symbols is often resorted to by the teacher with poor results. It is pretty well established that mere repetition without new associations availeth little. This work must be motivated. To this end the rhythmic instinct may be effectively employed.

The Rhythmic Instinct. — The child by nature is rhythmical. Because of this innate tendency symbols couched in rhythmic form are readily acquired. A jingle of several verses can be memorized in a ten-minute recitation. These words are readily recalled when needed. Therein

lies the secret of this motivating device. When words found in the jingle are not recognized elsewhere the child has recourse to *two* sources of help — the teacher and the jingle. If he draws upon the former he becomes dependent; if on the latter he learns to help himself, and thus develops the spirit of independence and self-activity, both of which stimulate mental growth. Thus the rhyme through its instinctive appeal becomes an effective device in furnishing a real motive for habituating written symbols in the early stages of the school.

Systems of Phonograms. — The so-called "phonic method" is another device for helping the child help himself, and though it has no instinctive basis, it makes such a strong appeal to the independent spirit of the child that it supplies a real motive in primary reading. It becomes harmful only when it is made an *end* rather than a *means*. In the introduction of written symbols it is not wise to begin with phonics since such a procedure places form before content. Phonograms should not be learned until the child has proceeded far enough in the interpretation of symbols to realize vaguely the value of phonograms in the mastery of the mechanics of these symbols.

In the acquisition of both words and phonograms the spirit of emulation should be appealed to. Phonograms and rhymes will stimulate all of the children some of the time and some of them all of the time. Neither will create a deep interest in all of the children all of the time. Other stimulating devices should be employed. Opportunity for rivalry should be given in habituating these arbitrary forms. Let one child contest with another in repeating the most words, reading the most sentences, pronouncing the most phonograms. Teams of various kinds may be

organized and operated effectively to add interest to this otherwise uninteresting work.

Over-emphasis of Phonograms Results in Short-Circuiting

Meaning of Short-Circuiting. — Constant drill upon phonograms and words to which the teacher of primary reading resorts, too frequently results in the short-circuiting of oral and written symbols. Children easily acquire the habit of associating sounds, instead of ideas, with written symbols. In the language of Hamlet they learn to read "words, words, words." To break up this pernicious habit and at the same time sustain interest is a serious problem. So far as we know no device has been employed as yet which is so effective in correcting this defect as that of dramatization. Its effectiveness is due, no doubt, to its instinctive character. The instinctive basis supplies the motive, and the character of the application produces mental alertness.

Two Phases of Dramatization

Action Reading. — As usually employed dramatization should be subdivided into what is popularly called *action reading* and into *dramatization proper*. Action reading is a simple device for forcing the child to get *ideas* instead of *sounds* from written symbols. By this method the teacher directs her children through written symbols and they respond in terms of some sort of activity. The pencil "tells" John to close the door, to walk to the window, to stand, to sit, to run around the room, etc. To recite means to interpret. There is no chance for deception. To fail means more humiliation than does the failure to produce oral

words. The ingenious teacher can devise games based upon the experiences of the child and in this way insure a high degree of interest in the interpretation of the printed page.

Dramatization. — In the latter part of the first year and throughout the remainder of the primary grades, interest may be enhanced by means of dramatization proper. Portions of a constantly accumulating vocabulary become more or less heavy and obscure, thus partially obscuring the thought, dulling the imagination, *and retarding* the enthusiasm of the child for his work. The setting of problems for the children to solve, approval of good interpretation, high marks and other common devices will stimulate the better children to increased effort. However, they do not affect seriously those who are lost in the vagueness and uncertainty of words. It is at this point that dramatization becomes a most effective device for improving the work.

Motivating Aspect of Dramatization. — Dramatic expression is as old as the race. Man expressed his ideas by means of natural symbols for ages before conventionalized symbols were employed. The persistence of the dramatic instinct down to the present time is manifest when foreigners are forced to express themselves in a strange tongue. Because of its strong instinctive tendency dramatization supplies a powerful motive force for the teaching of primary reading, history, literature, geography, and nature-study. However, the effectiveness of dramatization depends upon the method of employing it. It should be used as *a means to an end* and *not as an end in itself*.

By assigning to the different children of the class parts in the story to be dramatized, before the story has been studied in class, one increases the child's responsibility

many fold. By this method one imposes upon the child a part to play and he knows not how. The only possible source of information is the story itself. Possibly it has never occurred to him before that these pages of written symbols have a real message for him. In order to get the desired information he is forced to scrutinize the symbols carefully. He must think of the symbols in terms of ideas. He must feel as his character felt, and act as his character acted. By this simple device the teacher is enabled directly to stimulate children to desire the real meaning of a page, the study of which was largely perfunctory before.

Examples of This Method.—A single example will amplify this thought. The children are permitted to dramatize *Goldenlocks and the Three Bears.* The little girl who is to play the part of Goldenlocks does not know what to do. She is told that the book will tell her. The added responsibility incites her to find out what the story says. From the very nature of the case she is forced to image the situation, to see the separate chairs, one for the "papa bear," one for the "mamma bear," and one for the "baby bear." Likewise she must image the bed of each of these wonderful bears. She must understand the actions of the three bears and the motives that prompted them.

Dramatization as a device for motivating primary work needs little or no paraphernalia, no curtained stage, and no extra time for long and efficient drill. Indeed, when dramatization is made an end in itself, it not only ceases to be a device for motivating reading, but in all probability becomes positively harmful to children. The results of such training are contrary to our whole scheme of education. If modern education stands for anything, it is *that form is a tool for the conveyance of thought.* When form be-

comes over-emphasized it results in superficiality. A single dramatic presentation if highly specialized may establish insincere ideals that will continue in the life of the adult.

Telling the Story a Motivating Device. — Another effective device in the teaching of reading is that of having one child, chosen at random, re-tell the story read by the class. The certainty that some one will be called upon increases responsibility and thus intensifies concentration during the reading period. The desire of the child to relate the story to the others in the class is an instinctive tendency akin to the strutting instinct. The opportunity to tell the story becomes a strong motive in the preparation and presentation of the lesson. Few teachers make the most of this device. The best effort that we have known in third-grade reading was largely stimulated by its use.

In addition to its motivating power in reading, this device serves as a useful plan for the improvement of oral language. Language lessons usually fall short because of a lack of effective devices for inducing natural expression. The "telling of the story" is interesting enough to encourage a fine choice of words with which to express it.

Use of Pictures. — Pictures are also motivating factors in primary reading. The "picture book" is the delight of all children. Nothing can be more convincing of the worthwhileness of pictures than the beautifully illustrated readers for the primary grades. The modern reader is in many ways a work of art. Indeed, the greatest contribution to elementary reading in the past fifteen years is in the field of illustration. So sensitive have we become to the value of pictures, both as motivating factors and as a cultural force, that in some cases we have adapted our language to

the picture, rather than to the responsive attitude of the child. This oversight on the part of some textbook writers does not condemn the picture, but on the contrary reveals the fact that illustrations have proven so helpful as a means that they are made an end by some over-enthusiastic advocates of the cultural school.

Suitable Reading Materials

Former Source of Reading Materials. — The character of the story itself is in many respects the most significant motivating factor in primary reading. Until recently, subject-matter in reading was handed down from above. Primary reading bore somewhat the same relation to the classics that the high-school course of ten years ago bore to the university courses. In the latter case the university imposed upon the high school the elements of subjects that were pursued in college. The result was that in many cases the subject-matter made little appeal to the secondary student, since it did not relate closely enough to his interests except when he had planned for himself a professional career.

Reading for children has undergone a similar metamorphosis. The classics were handed down through the grades, varying only in difficulty of technique. By the time the work was outlined for the upper grades there remained but a mere remnant for the lower grades. Fortunately our more recent writers have recognized in part that the child is the first consideration in the selection of primary reading matter. They have recognized what President G. Stanley Hall pointed out a number of years ago, that there is a tendency for the child to recapitulate the life of the race. Consequently the short, disconnected

sentences of the old first reader have been displaced by the jingle and the mythical story.

The Instinctive Basis. — The rhythmic instinct and the innate tendencies of wonder, make-believe, and fancy give a glowing interest to jingles and myths in the first two grades. The mythical story, merging into stories of animals and especially heroic animal stories, furnishes interesting materials for the third and fourth grades. The heroic story and biographies of heroes are best adapted to pre-adolescent children. The pity of it is that we need to use stories of this character that are couched in language so difficult that much of the interest is lost in an effort to master it. This is due largely to the fact that we still depend upon the stories of chivalry for these grades. The consequence is that many of the words are unfamiliar because they have no modern significance. What the intermediate grades need most of all just now is some reputable heroic stories couched in twentieth century language which is simple enough for the children to readily comprehend.

While there are still many defects in our reading materials, they are infinitely superior to those of a generation ago; and while the millennium is still far off, it would be brought much nearer if theory and practice were properly united. Many of us are so old-fashioned, so conservative, so imitative, that we like readers modeled after the good readers of our own school days. It is hard to secure the publication of reading materials based entirely upon pedagogic principles, since they will not sell sufficiently to justify their publication.

CHAPTER XIII

APPLICATION OF PRINCIPLES TO PRIMARY ARITHMETIC, WRITING, AND SPELLING

Origin of Methods in Arithmetic. — Many of our so-called methods in arithmetic are but partial truths elaborated out of all proportion. The result is that much of our primary arithmetic has been one-sided, unnatural, and uninteresting. For example, Pestalozzi's notion that number concepts should be built up from sense contact with objects — a theory that has materially influenced our practice — though true, by no means represents all the truth. It does not take into consideration the native interest of the child, which is indeed an important consideration. As Dewey has pointed out, the application of the unit in measurement, because it affords opportunity for movement and because it relates more directly to the child's natural experiences, is vastly more interesting to children than the observation of cubes, rectangles, pyramids, and the like, advocated so strenuously by the Swiss reformer.

Notable Features in Textbooks. — The most notable features of primary books in arithmetic, excluding the absence of obsolete subjects, are the attempts, first, to present subject-matter in such a way as to develop mathematical concepts inductively; and secondly, to present topics in the cyclic, or psychological, way. Both of these

methods employed in primary arithmetics are a decided concession to the rights of the child in the learning process. Mathematical concepts through the measuring process are gradually developed without the child being conscious of the fact that the teacher has purposely, though pleasantly, helped him to acquire new and useful concepts. Ideas of the perimeter and area of rectangles are developed as a by-product through the solving of practical problems in which the child measures walls, yards, and gardens for the purpose of estimating the amount of paper, sod, and seeds needed respectively to meet the demands of the problem. These problems appeal to his experience and thus stimulate effective effort. Such problems are but means to an end in the acquisition of mathematical concepts.

Motivating Factors in Primary Arithmetic

An Initial Device for Creating Motive. — "Keeping score" in the little games initiated by the teacher beautifully stresses the intrinsic function of arithmetic. Here for the first time the child feels a real need for written arithmetic. He wants *his* side to win and for that reason he has an impelling desire to master the tools which control the situation. Bean bags or walnuts, and a waste-basket are all the materials required to initiate this game. The teacher appoints two captains who choose sides. Each member of a team when his turn comes pitches four bags at the basket. Each captain keeps score for his team. When all have pitched the teacher asks for the results. This stimulates computation in earnest. At first only a few will fully comprehend what is being done. Some bright pupil will add the two columns of scores, compare the sums, and if his side has won will probably begin to clap his hands; if he

loses, he will look abashed. After the result is comprehended the game is continued as before.

Keeping Store. — Keeping store makes a strong appeal to the interests of pupils. It relates to their home experiences and makes a keen appeal to their curiosity. The financial factor has made store articles forbidden fruit. Freed from this economic restraint by the use of paper money, the child's desire for investment runs rampant. The necessity of accounting for his investment develops a sense of the intrinsic function of arithmetic and lays the foundation for habits of the fundamentals.

The greatest weakness in this phase of primary method in arithmetic lies in the lack of a graded series of projects capable of being extended over a long period.

Use of the Cycle. — The psychological, or cyclic, method of presenting arithmetical topics rather than the logical method has made for greater interest in arithmetic. The topical method ignores the fact that the various arithmetical topics depend more or less upon each other and consequently an attempt to master one topic thoroughly, before considering others, deprives the child of knowledge that is needed in the mastery of the first topic considered. Then, again, such a procedure ignores the fact that ability to understand depends upon maturity, both in the sense of experience and in the sense of natural development. While the native ability and natural experiences of a child of ten or eleven enable him to understand some of the elements of percentage or of mensuration, they by no means qualify him to understand these subjects sufficiently to meet the demands that will later be made upon him.

Persons who object to the cyclic method do so on the ground that it is difficult for the teacher to follow con-

sistently. For example, the teacher of the seventh grade when considering percentage is not quite sure what experiences the child has had in this subject in previous grades. The course of study should reveal this, but better still the child should reveal it. If he does not it is evident that a review, at least upon the fundamentals of the subject, is essential to further work. Progressive ideas in arithmetic method have suffered more perhaps than in any other subject with the exception of grammar. This is probably due to the tradition that has been persistent here. The exactness of these subjects has made them less adaptable to the needs of the child and has made it more difficult for the teacher to lay aside the method of her own school days and adopt one different in form and structure.

Problems Should Precede Drill. — Excesses in primary arithmetic usually result in one of the following practices: Either too much consideration is given to drill exercises upon the four fundamentals at the expense of problem-solving, or problem-solving is given major consideration with the thought that skill in the fundamentals will come as a by-product. A "middle of the road" policy is better suited to the needs of the pupils. A strong lead with problems which grow out of the child's needs, followed by supplementary drill exercises properly stimulated by instinctive appeals, brings the best results. These processes are complemental, not supplemental, to each other. The one tends to strengthen the other.

Accuracy and Speed. — Accuracy and speed are assured only by reducing these processes to automatic reaction. Recent tests given in the Training School at Normal, Illinois, show conclusively that there is a close correlation between accuracy and speed. These tests indicate that a

number combination that is habitual is worth more to the possessor than one which must have conscious direction.

To the extent that fundamentals are habituated in the early grades one can feel assured that energy will be conserved in the higher processes of the upper grades. Free the child from the drudgery that results from inefficient preparation in the fundamentals and you have added materially to his power and interests. Again, accuracy in the fundamental processes insures success, and success is in itself a strong stimulating factor.

Since the child is largely a creature of impulse — of instinct — his native reactions must be drawn upon to intensify the personal experiences that the school sees fit to create. As these personal experiences increase and thus form the basis for other experiences, they should be appealed to. The problem, often in the form of the indirect question, is an effective device for stimulating thought. It is so because it is a natural one. From the time the child began to creep until he arrived at the school he had been solving problems because he found gratification in so doing. This gratification arose partly from the desire to know and partly because of the social approval it afforded.

Success. — We must not retard this problem-solving tendency by withholding social approval in the schoolroom. It is a positive motivating force. Strong students usually receive sufficient approval. The teacher who understands the importance of social approval as a motivating factor in the solving of the problems of the school will avail himself of every opportunity to encourage the children by manifesting appreciation of every worthy effort, especially of those who are less fortunate than their fellows.

Reduction of Processes to Conserve Energy

The Austrian methods of subtraction and division commend themselves to practical school men because they reduce the number of processes to be learned. Though these methods may never become general in America, they are, nevertheless, based upon good psychology. The reduction of four processes to two by the method of elimination, provided this reduction is adequately done, conserves energy.

The following forms indicate the procedure necessary to conserve energy.

Austrian Method of Subtraction.— The solution of the problem $\begin{array}{r} 9 \\ -5 \\ \hline \end{array}$ should be read: 5 and 4 are 9. (The 4 should be written when read.)

The solution of the problem $\begin{array}{r} 235 \\ -47 \\ \hline \end{array}$ should be read: 7 and 8 are 15 (the 8 should be written when the number 15 is read), 5 and 8 are 13, 1 and 1 are 2.

Method of "Carrying."— Use of the method of "carrying" employed above is comprehended by the pupil if the teacher keeps in mind and makes clear to the pupil, 1st, that the *difference* is found by adding and not by subtracting; 2d, that the minuend (in the new process) is the *sum* obtained by collecting the (subtrahend and the difference) two addends.

The problem $\begin{array}{r} 64 \\ -29 \\ \hline 35 \end{array}$ should cause no trouble when the following form is used to explain the process:

$\begin{array}{r} 29 \\ 35 \\ \hline 64 \end{array}$ is read 9 and 5 are 14; 3 and 3 are 6. The pupil will be able to see that the same process is involved when the *sum* is written *above* the addends as when written *below* the addends.

Since the pupil is required to add down the column when finding the difference it is desirous that he add down the column when finding the sum.

Austrian Method of Division. — The approach to this solution should be a multiplication approach. One should think constantly in terms of multiplication.

In the solution of this problem one should proceed as follows: 3×24 is 72; 5×24 is 120; 2×24 is 48. The subtractions involved should be thought in terms of addition as explained above.

$$
\begin{array}{r}
352 \\
24\overline{)8448} \\
\underline{72} \\
124 \\
\underline{120} \\
48 \\
\underline{48}
\end{array}
$$

An Analysis of the Writing Problem

Intrinsic Function of Writing. — The intrinsic aims of the teaching of writing in the public schools are: a relatively high degree of legibility, speed, freedom, and ease of movement. It is the business of the teacher to diagnose the writing of her room in order to determine the relative merit of the qualities referred to above.

Application of a Writing Scale. — The degree of legibility may be determined roughly by means of standardized scales, such as the Ayres [1] and the Thorndike scales,[2] or more analytically, by means of the Freeman Scales.[3] A consistent legibility of seventy per cent on the Ayres scale produced at the rate of one hundred words per minute should be sufficient evidence that the pupils' time may be better employed at some other work than at special exercises in writing.

[1] *Handwriting Scale*, Ayres. Russell Sage Foundation, N. Y.
[2] *Handwriting Scale*, Thorndike. Teachers College, N. Y.
[3] *Teaching of Handwriting*, Freeman. Houghton Mifflin Co.

Form of Movement and Quality of Writing Habit

Freedom and ease of movement depend primarily upon the form of movement employed and the quality of habits established. Fortunately there is a pretty common agreement as to the form of movement which should be employed and as to the laws which are fundamental to the establishment of the habits required.

Muscular Movement. — Relative to the form of movement, Professor Freeman says: "The arm movement with rest — the so-called muscular movement — seems likely to become practically universal in American Schools within twenty-five years." This movement is adaptable to any of the common slants and meets the needs of any of the so-called systems of writing now "touring" the country.

By far the biggest problem in writing is still unsolved after slant, alinement of letters, and form of movement have been determined. The problem yet unsolved is that of reducing the proper writing movements to habit.

Psychic Principles Involved in Writing

Fundamentally, habit-forming in writing is not different as a teaching process from habit-forming in other subjects. It differs merely in detail and emphasis.

A Disagreement among Writing Masters. — The greatest disagreement and consequently the most discussion have resulted from the application of the first law in habit-formaeion to the teaching of writing habits. There is a disagreement as to what the attention should be focused upon at the beginning of the process.

The Visual Percept. — Writing teachers have generally maintained that a visual percept of the desired form is a

necessary prerequisite to movement in writing. To this end correct forms have been prepared for the pupils, and devices have been constructed which make it possible to keep these forms constantly before them during the writing period.

This belief has also been the source of many of our so-called systems of writing. Slight differences in the form of the letters and variations in the drill exercises have constituted the essential differences in the "systems" and "methods" which the uninitiated refer to with pride.

The Montessorian Method

The Muscular Percept. — Montessori was the first to question seriously the potency of the visual percept in the establishment of the fundamental habits of writing. She maintained instead that the writing movement depends upon muscular percepts. These she maintained are most economically formed through controlled letter movements by means of grooved letters. This forces muscular control and eliminates an enormous amount of waste occasioned by the chance variation resulting from an attempt to express the visual percepts.

By this means Montessori has obtained marvelous results. It is never safe, however, to evaluate a method without eliminating the teacher, since great teachers get astonishing results with almost any method. There are other experiences which seem to corroborate the Montessorian inference. Muscular control of mechanical devices for manipulating machinery, the adaptation of one's body or position to the furniture, to the saddle, and to other situations where specific adaptations are made by establishing automatic reactions, seem to corroborate the theory of the muscular percept.

Since the Montessorian method has scarcely affected the schools of America we need concern ourselves only with the habits involved in ordinary writing.

Application of the Formal Steps to the Teaching of Writing

Focalizing the attention upon the thing to be habituated is the first conscious step in the teaching of habits. It applies to the teaching of writing also. It involves a close scrutiny of the form, slant, and alinement of the letters in the copy and of the position required to produce the movement needed. Personal demonstration and guidance by the teacher at the outset will prevent the undoing of many half-formed habits in writing. Once the letter to be made and the movement required to produce it are clearly visualized, the next step is needed.

The second step, that of creating initiative, according to James, is the test of the successful teaching of writing. To this end, Rowe points out that the teacher should regard the whole list of instincts as a keyboard upon which he is to work out the harmonious reactions essential to good writing. Enthusiasm should be generated sufficiently to propel repeated and thrice repeated movements until the form is satisfactory and the movement habituated.

A single shot, though it bring down the object sought, is but a slight indication of shooting skill, since the law of chance is always operative. Nine clay pigeons out of ten is necessary to win the respect of sportsmen. A single ball over the home plate with a good quality of curve and speed will in no wise insure the sender a position in a National League game. Consistency in either case is necessary to ultimate success. But consistency in shooting

and in playing ball comes only after multitudinous efforts, made possible and endurable by an abundance of enthusiasm and unyielding determination.

What is true in the sports is true in the formation of correct habits of writing. Success in writing depends upon one's ability to maintain an abundance of enthusiasm in order that consistency of effort be sustained until the habit is formed. Repetition in and of itself may amount to very little. Indeed, it may be as harmless in writing as in ethics, unless it be repetition of the right sort. A high degree of continuous interest is absolutely necessary to maintain drill for a sufficient length of time to insure the proper habit.

The effect of repetition in writing varies from zero to a high degree of success. It all depends upon the conscious effort expended in this third step in habit formation. Too frequently, practice in writing is little more than mere perfunctory routine which fixes bad habits as persistently as it establishes new ones. Much of the dead wood of learning is in the so-called lifeless drills. An appeal to the instincts must be made until a wholesome enthusiasm is established.

A frequent measurement of the quality of the handwriting in a room by means of a standard scale is wonderfully motivating. Children like to work when their progress is measured. They have little incentive when it is not. It is quite common for a grade to raise its average quality from forty per cent and forty-five per cent to sixty-five per cent and seventy per cent, in three or four months under the inspiration of frequent measurements.

The setting aside of one school day each spring to be known as handwriting day is a great impetus to writing.

The growth indicated in the improvement of the various grades should be displayed both by samples and charts. It offers an opportunity for the pupils of the school to compare the work of the several rooms and to get the inspiration such a comparison affords.

The prevention of exceptions, or fourth step in methods of handwriting, is best secured by keeping up a high degree of interest. The mechanical device of moving the unwritten line up to the copy when the preceding line is completed should aid in this particular. The constant attention of the teacher is required at this juncture to maintain a high degree of efficiency.

The Spelling Problem Analyzed

Influence of Reformers. — Spelling, like reading, has been the victim of the intellectualizer on the one hand and the habit former on the other. There has been a steady swing of the pendulum back and forth between these two classes of spelling reformers. Judging from the literature that has been put upon the market in the past fifteen years, there is to be quite a little vibrating of the spelling needle before it comes to rest upon the zero mark.

Rice's Contribution. — In the April *Forum* of 1897, Dr. J. M. Rice submitted his findings on spelling, which were continued in the June number of the same magazine. After culling over an extensive amount of material he arrived at the strange conclusion that "In learning to spell maturity is the leading factor, while method plays only a subordinate part." He says, "There is no direct relation between method and results." This is certainly a strong indictment, and one that should challenge the attention of teachers of method. He thinks that variation in results

depends upon, first, maturity; and second, upon the ability of the teacher. Strange as it may seem, however, as Cornman points out, he advocates a daily drill of at least fifteen minutes and recommends the teaching of rules which have wide application and few exceptions.

Cornman's Contribution. — In 1902, Dr. Oliver P. Cornman issued a monograph from the psychological laboratory of the University of Pennsylvania, on spelling efficiency. He arrived at conclusions very similar to those of Dr. Rice so far as method in teaching spelling is concerned. Referring to the value of teaching spelling, he says, "The conclusion, therefore, is forced upon us that a method of teaching spelling, the suspension of whose operation for three years is not plainly manifested in such a series of tests [as he gave], is of so little importance as to be practically negligible." His further conclusions are: "It is therefore advisable in view of the economy of time, to rely upon the incidental teaching of spelling to produce a sufficiently high average result." The conclusions of Rice and Cornman have done much to distribute responsibility for spelling to the various school subjects and to cause in many schools a discontinuance of the separate spelling lessons or drills.

Wallin's Contribution. — Nine years after Cornman made his report upon spelling another monograph on spelling came forth, and strangely enough it came from a laboratory of clinical psychology — this time from Dr. J. E. Wallace Wallin of the New Jersey state village for epileptics. Referring to Rice's and Cornman's conclusions relative to the efficiency of spelling methods, he says, "These conclusions fly directly in the face of the results of tests by other investigators — Newman, Abbott, Krantz, Charters, and

those carried on in the Milwaukee and Cleveland schools." After calling attention to the splendid results obtained in the two cities mentioned above, by systematic drill, he says, "Obviously the above facts do not warrant the assertion that *method* in the teaching of spelling is merely an incidental detail, nor do they lend support to the contention that modern pedagogy demands the substitution of the incidental for the drill method, as advocated by Cornman."

Application of Rules. — It will be remembered that Rice advocated a few rules in the teaching of spelling. Many texts and many teachers of spelling have used rules freely in the teaching of spelling before and since that time. To test the efficiency of rules in this connection, W. A. Cook, a fellow at the University of Wisconsin, carried on a series of tests with academic students and with college freshmen. After giving the details of his findings he concluded that rules in the teaching of spelling are not effective unless in the hands of an exceptional teacher. He says, "The writer does not believe that a single rule which he tested demonstrated its efficiency, excepting, the rule that applies to words ending in 'ie' which is changed to 'y' when adding the suffix 'ing' — a rule without exceptions." He continues in the following language: "It is at least evident that rules for spelling do not teach themselves; that thoroughness of digestion demands that they be given in widely separated doses, and that they must be introduced, if at all, in the elementary school during the habit-forming period. The presumption is even then against a favorable outcome except with a superior teacher."

The results of an experiment carried on in the Training School at Normal, Illinois, substantiates Cook's conclusions

so far as they refer to rules of a relatively limited application. Statements from persons considering themselves good spellers also corroborate Cook's conclusions as to the efficiency of rules.

Results of Investigation. — Two splendid results have come from all these investigations in spelling: First, the early investigations in spelling by Rice and Cornman led directly to the research work which has culminated in the *objective standards* that are proving of great educational value. Second, they have been directly responsible for the investigations of the *spelling vocabularies* of the children in the several grades, by Jones and others. Jones's investigation alone in this particular is an epoch-making piece of work.[1]

The old lists of words retained in the spelling archives for generations are being revised. Words which do not have vital significance to pupils are eliminated and those of which the child is in daily need are used. If the spelling revolution has accomplished nothing more than a revision of the spelling lists, it has been well worth while.

Simplified Spelling Received a Strong Impetus

The simplified spelling movement secured a strong impetus from the spelling revolution. The ultimate effect of this movement upon spelling cannot be foretold as yet. The fact that it is firmly supported by many persons of distinction and ability indicates that many of the intricacies of words gradually but surely will be removed. This movement will not down for long. Succeeding waves will be stronger than those which preceded them

[1] *The Child's Own Speller*, Jones.

until a decided improvement in the structure of many of our common English words prevails.

Best Methods of Teaching Spelling Still in Doubt. — On the method side, the results have not been so satisfactory. There is plenty of evidence to show that there exists a decided disagreement over methods of teaching spelling. Students of spelling are divided mainly into two camps, those who believe in rationalizing the spelling process by means of rules, and those who consider spelling, in the main, an ideo-motor performance, subject to the same laws as writing and the mechanics of reading. The marvelous results of drill secured in the Cleveland schools by Hicks; the findings of Wallin, Cook, and others; the uncertainty of rules by good spellers; and the general tendency to revert to the old-time spelling match, growing out of a consciousness of the inefficiency of our spelling — all tend to corroborate the belief that spelling should be reduced to the lower nerve-centers, so to speak, and that an abundance of highly intensified drills are essential to secure this result.

Application of the Laws of Habit Formation to the Teaching of Spelling

Proper focalization in spelling in the first stages means rationalization. It means an understanding of the content of the words found in a familiar context. In the case of words of many syllables, it implies marked attention to these syllables; in the case of homonyms, it means the mastery of one and a sharp comparison of the second with the first. It signifies everything that gives the child a clearer visual, auditory, and muscular percept of the word to be learned. Here as in writing it consists of more than the intellectual process. There must be enthusiasm, de-

termination, and a passion for winning. As in writing, a play upon the instincts, if rightly conducted, will bring excellent results. It is in this stage of the process that good teaching is easiest distinguished from poor. Many a race is lost in sight of the goal. This is especially true of the spelling race. Persistent and attentive repetition is an earmark of good method in teaching spelling also. It is the factor that distinguished the spelling of a generation ago. It is an essential factor yet. The teaching of spelling incidentally does not meet the requirements of the third factor in habit formation.

Frequent testing by means of standardized tests will stimulate the pupils to greater concentration and will guarantee a higher degree of success. It is an important factor in preventing exceptions, also, and should therefore aid materially in the growth of spelling ability.

CHAPTER XIV

STANDARDS FOR MEASURING RESULTS OF TEACHING

General Meaning of Efficiency. — At present our pedagogical literature bristles with the term "efficiency." Even writers of ability use it extravagantly. The term itself seems to satisfy. It suggests the shop, the factory, and the salesroom where performances are judged in terms of the concrete and where definite standards are blocked out in open competition. It apparently pacifies the longing for scientific accuracy and generates a feeling of confidence in him who sets it up for his goal.

Unfortunately the teaching profession in the main has adopted efficiency as its slogan without making adequate provision for determining when it is attained. Until the spokesmen for the profession can in a very simple and in a very practical way point out the meaning of efficiency as it relates to specific attainment and can give explicit directions for obtaining a high degree of efficiency by this or that sort of teaching, the term "efficiency" must remain more or less platitudinous.

Measurement of Efficiency in the Industries. — In the industries the ability of the performer is easily measured, since the products of his labor are objective, concrete, and readily subjected to comparative tests. The efficiency of the blacksmith is measured by the length of time the shoe

clings to the hoof and by the degree of comfort it gives the horse. The efficiency of a dentist is measured by the length of time the filling remains in order or by the permanence and comfort of the bridge he has made. The efficiency of a gardener is determined by the number and quality of vegetables produced per unit of area. In any case when the result is better than that ordinarily produced the performer is thought of as having superior ability, and consequently he is considered relatively efficient.

Subjectively considered, *efficiency is the ability to produce superlative results consistently.* The median or average of all the abilities in a select group is a desirable standard to use in an endeavor to determine the merit of individual performances. In the industrial and scientific fields such standards are well known. In the teaching profession we have just begun to use them advantageously.

Legal Aspect of Standards. — With the single exception of the minimum knowledge requirement, which is generally provided by law, there is no other legally accepted standard for judging teaching efficiency. The wide and varied use of standards employed in determining the ability of teachers is notorious.

The far-reaching significance of the conditions resulting from the application of dissimilar standards is beyond the comprehension of those who evaluate the teaching process in terms of local and personal standards. There is not a little evidence to substantiate the opinion that subnormality, retardation, disinterestedness, disobedience, and withdrawals from school are the direct result of the inadequate standards held by administrators and teachers. Until some of the standards now employed in measuring the results of the teaching process are discarded and others

are materially modified, the proportion of abnormalities occurring in the schools will not be changed materially.

Classification of Standards of Measurement

There are two distinct classes of standards now employed in determining the merit of teaching. These may well be called subjective standards and objective standards. The former are notions of the relative merit of a performance. These notions may be imitated; they may be implicit deductions from insufficient and poorly evaluated individual experiences; or they may be *a priori* in origin. It is certain that no two persons have the same subjective standard. The latter consists of the median or average accomplishment expressed in accepted units, such as per cent, of a widely distributed yet carefully selected group.

Subjective Standards

This class of standards is in the main the outgrowth of an attempt on the part of teachers, administrators, and patrons to judge the results of teaching in terms of opinion or in terms of data highly colored by opinion and personal prejudices.

Many subjective standards were generally introduced in the early stages of educational development and are still employed by persons unfamiliar with the science of measuring the results of teaching. The value of some of these standards has been confirmed by educational experts. The importance of these standards consists mainly in stimulating an analysis of the process and in giving valuable direction to teaching. They are not valuable as standards of merit.

Pupil-Community Attitude. — This standard is too frequently used by school officials in determining the merit of their teachers. If the children and the community are fond of a teacher it is assumed that he is giving splendid service in the classroom. If he is not generally popular it is taken for granted that he is giving poor service. Doubtless this standard was developed in and about the private school, and especially the subscription school where the teacher "boarded around." Under such conditions adaptability was the prime requisite of survival. In spite of the wonderful growth in the science of teaching there still exists in some communities the notion that popularity is an index of efficiency.

It is reasonably certain that a teacher of character and of fine teaching ability will win the respect and usually the admiration of his pupils and patrons. It is quite as reasonably certain that a relatively inferior teacher may and not infrequently does win the esteem and hearty support of the entire community in which he teaches. This esteem may result from local political activity, church connections, participation in club activities, or it may be in response to a wholesome attitude of the teacher towards the life of the community, all of which may be excellent supplementary qualities for a teacher to possess. Certainly they should not be the main consideration in the selection of a teacher.

Being a "good fellow" is an enviable human trait, but it has no legitimate place among the basic standards with which to determine the worth of teachers. The social and personal qualities of the officers of a bank do not become an incentive to one with money to deposit until the standing of the bank and the integrity of the officials have been

ascertained. The hearty greeting and the talkative propensities of a barber do not become an inducement to one to patronize his shop until one has determined the fine quality of his razor and the sanitary practices of his establishment. No thoughtful parent will let church connections, social prestige, political affiliations, or friendship of long standing be the predominating factor in the choice of a physician for his dangerously sick child. Certainly there are stronger reasons why these supplemental and most desirable qualities should not be considered basic in the selection of a teacher.

Grades and Promotions. — Another common and widely used standard of judging teaching efficiency, and one closely related to the above, is that of grades and promotions. It is passing strange that this standard of measurement should be relied upon so extensively. A parent usually thinks his children well taught if they receive high grades. He is quite as strongly convinced of the teacher's inferiority if his children fail of promotion. In view of recent investigations in respect to the reliability of grades as an index of actual achievement, this standard is a travesty upon the science of education. A grade as ordinarily determined, to say the least, is the expression of a conglomerate impression which may be colored by a single performance of the pupil, by his general attitude towards the school, by the emotional attitude of the teacher, or by the personal relations which exist between teacher and pupil or between the teacher and the family of the pupil.

Grades vary in proportion to the variation in personal standards. It is reasonable to suppose that an easy-going teacher is more likely to give high grades than is the

teacher who is excessively conscientious and diligent in an endeavor to improve the standing of his pupils. It not infrequently happens that the grades of two chums, or of two children whose families are intimate, are adjusted from month to month so that first one pupil and then the other has the higher grade. It is notorious that good children receive higher grades in proportion to their ability than do mischievous children. Other influences well known to the profession are factors in determining grades. The multiplicity of factors involved in grade-making is a strong indictment of the practice of judging teachers exclusively or even partially on the basis of the promotion list.

Classroom Technique. — The value of this standard rests on the assumption that there is a close correlation between the character of the stimuli employed by the teacher and the character of the child's controls which result from the use of such stimuli.

On the basis of this assumption one proceeds to determine a teacher's efficiency by an examination of her classroom technique. The following items are usually considered in such procedure: (1) forms of presenting subject-matter, such as the lecture method, the textbook method, the developing method, including a combination of one or more of these methods; (2) the character of the question employed — the direct question, indirect question, elliptical question, and the leading question; (3) the sort of other devices used — illustrations, drawings, field trips, concrete materials for science work, pictures, and maps; (4) the language of the teacher, his intonation, the board work, the general appearance of the classroom, and especially the spiritual atmosphere of the room.

This standard is decidedly more reliable than either of

those previously considered. It finds justification in the common agreement that the majority of teachers who get splendid results employ a good technique. In fact, teachers of this type find technique indispensable. It is in harmony also with certain generally accepted psychological principles. However, technique is not of itself a sufficient guarantee of adequate results, because of the large number of variables introduced in its application. The value of a device depends in large measure upon the experiences, judgment, temperament, zest, clearness of vision, physical energy, and high ideals of the teacher. Without these attributes in their proper proportion, technique is the lifeless movement of school machinery; with them it is a dynamic force which produces accuracy, effectiveness, consistency, and the proper distribution of time and energy.

The Reactive Attitude of the Child. — In discussing the relative merit of this standard with that of the preceding one, F. M. McMurry says:[1] "Teachers, supervisors of teachers, and authors of books on teaching have been so intently observant of the procedure of the teacher that they have overlooked that of the pupil. Yet the center of gravity of the school lies in the pupil, and what he himself finally does determines the value of the teacher's efforts. He therefore should be the primary object of consideration rather than the teacher, and the quality of the instruction should be judged mainly in terms of his activity."

In conformity with this notion McMurry formulated the following criteria for the measuring of teaching efficiency:[1] (1) motive on the part of the child; (2) consideration of values by the pupils; (3) attention to organization by the pupils; (4) initiative by the pupils.

[1] *Elementary School Standards.* World Book Company.

The superiority of this standard over those previously mentioned is at once apparent. It strikes right at the heart of the learning process, or as Tompkins would put it, at the spiritual unity of the child. The author of the above criteria not only believes in the theory that "the center of gravity of the school lies in the pupil," but he applies this theory daily in his classroom.

As principles of direction the above criteria are all that is desired. They force an analysis of the teaching process, and suggest the proper distribution and emphasis of the teaching agencies. They are basic to our whole scheme of pedagogy. To abandon the principles underlying these criteria would be to ignore teaching as a profession.

Though indispensable as an agency for the *improvement* of teaching, these criteria are decidedly inadequate as a means of determining the relative *merit* of teaching. Their inadequacy is due to the fact that the character of their application depends entirely upon the judgments of those who attempt to determine the merit of teaching. The *necessity of interpretation introduces a decided variable.*

The decisions of several judges as to the merits of a certain recitation will vary in proportion to the variation in their experiences and insight. What may seem to be "motive on the part of the child," to one observer, may appear as excessive emotion to another. Indications of a "consideration of values," to one judge, may appear as a wanton neglect of essentials to another. "Attention to organization," to another observer, may impress his associates as being a mere juggling of facts. Indeed, what may seem to one critic as "initiative of the pupils" may appear to another as rampant individualism. Just as the jury is an uncontrollable variable in the machinery of

justice, so the supervisor as a personal judge of teaching efficiency is a variable that is exceedingly difficult to reckon with in the application of the McMurry criteria.

Guides and Unstandardized Scales. — Numerous guides and scales have been developed of recent years for estimating the work of teachers. These are valuable to the supervisor in that they force analysis of the teaching act and thereby make it possible for him to determine the relatively strong and weak points in the recitation, and afford an opportunity for him to give the teacher some practical suggestions as to the improvement of methods.

The following "ten-point scale" is somewhat typical of helps of this sort.

TEN-POINT SCALE FOR ESTIMATING CLASSROOM WORK IN HIGH SCHOOLS [1]

I. "Setting" of class topics in the course.
II. Mastery of intellectual content and effective logical organization of materials.
III. The mechanics of classroom management. Economy of time and grasp of pedagogical technique.
IV. Effective emphasis upon the mental processes and values peculiar and essential to the subject.
V. Independence of teacher and class as a growth toward their material.
VI. Suitability to the pupil of the type of recitation employed.
VII. The "common sense" factor.
VIII. Evidence of culture *versus* mere erudition.
IX. Class participation and class sense of responsibility.
X. Class respect for learning.

Scales of this sort do not, however, materially assist the supervisor in judging teaching efficiency. In the

[1] A tentative scale prepared by the late Professor Charles Hughes Johnston of the University of Illinois in conjunction with the Principals' Club which he founded.

application of this scale, as in the application of the McMurry standards, a marked variable is introduced in the judge who applies it. Furthermore, the points are not of equal significance. Some of these points are several times more significant than others. Two teachers of widely different abilities when measured by this scale may receive the same numerical mark. One may be stronger in the essentials; the other, stronger in the non-essentials. Even if the relative value of each point were determined, the former objection holds.

CHAPTER XV

GROWTH AND APPLICATION OF OBJECTIVE STANDARDS

Classes of Objective Standards. — Objective standards fall roughly into two classes: standardized scores and standardized scales. A standardized score is the median score of all the individual scores made upon a carefully graded test, by a highly selected and widely distributed group of pupils. For example, the median score made on a special test in arithmetic by eighth-grade pupils in many villages and cities of several states is a standardized score. A standardized scale is one composed of a graded series of pupils' contributions each of which has been given a value relative to one whose value has been arbitrarily fixed. Usually the contribution with the arbitrarily fixed value is at the top or bottom of the scale.

The Ayres Handwriting Scale is a standardized scale. The Thorndike Drawing Scale and the Harvard-Newton Composition Scales are standardized scales also. These scales were determined by arbitrarily fixing the value of one or two contributions and then proportioning the other values in the order of their relative merit.

Objective standards generally have been called "tests" or "scales." Since a "scale" is also a test, it is evident that "score" is more descriptive of the fact than "test." For this reason the classification used here consists of scores and scales, respectively.

Origin of Objective Standards. — Dr. J. M. Rice is the father of objective standards in America. Zealous for better opportunities for the child, enthused by his psychological studies at Jena and Leipsic, free from prejudices which sometimes result from a limited experience in teaching, he set for his task the exposition of certain evils which he conceived to exist in the public schools. Consequently from 1891 to 1896 he became a critical student of education. After examining the schools of one hundred American cities, he pointed out in the columns of the *Forum* what seemed to him to be remedial measures for the schools of those cities.

After four years of constant investigation he came to the very decided conviction that concerted effort towards obtaining satisfactory results in public education is impossible until it is known what satisfactory results are. "If we do not know," he wrote in the *Forum*, December, 1896, "what we mean by satisfactory results, how shall we be able with any degree of intelligence to judge when our task has been satisfactorily performed? Until we come to a definite understanding in regard to this matter, our entire educational work will lack direction and we shall continue, as heretofore, to grope our way along passages completely enveloped in darkness in an endeavor to land we know not where.

"If we might have a standard which would enable us to tell when our task has been completed, our attention might be earnestly directed towards the discovery of short cuts in educational processes. For want of such a standard each individual teacher has thus far been a law unto himself; permitted to experiment on his pupils in accordance with his own individual educational notions, whether in-

herited from his grandfather or the result of his study and reflection, entirely regardless of what was being done by others. So long as this condition is possible pedagogy cannot lay claims to recognition as a science. Until *an accurate standard of measurement* [my italics] is recognized by which such truths may be discovered, ward politicians will continue to wield the baton and educational anarchy will continue to prevail."

Spelling Standards

The First Objective Standards. — In his characteristic way Rice set out in 1896 to establish a standard of measurement for spelling. He undertook personally the herculean task of examining 13,000 children in spelling. This investigation extended over a period of sixteen months and included sixteen American cities.

The children were tested on a list of words, on words given to them in sentences, and on the words used in their compositions. The tabulated results in the *Forum* for April, 1897, is, so far as I have discovered, the first objective standard in spelling or in any other subject. The list of words standardized by him consists of too few words to be of service in judging the spelling abilities of children. The list of words presented in sentences is subject to the same criticism. This objection does not hold for his composition test. Had he estimated the per cent of words correctly spelled in the compositions on the basis of the number of different words used, instead of upon the basis of the entire number of words used, he would have established the first practical objective standard. As it is, his per cents of words correctly spelled are entirely too high.

Cornman's Spelling Standard. — Dr. O. P. Cornman of

Philadelphia, stimulated by the work of Rice, carried on a series of tests in spelling by the composition method, extending from June, 1896, to June, 1898. In 1903 he published the results of this investigation in a volume entitled *Spelling in the Elementary School*. Though Cornman's data were carefully gathered and methodically tabulated, the results which he obtained were little more satisfactory than those of Rice, in that he counted all words in the composition and determined the ratio of the spelled words and misspelled words in terms of per cent. He not only counted the recurring words which were spelled correctly but the recurring misspelled words as well. This accounts for his percentages being lower than those reported by Rice.

The work of Rice and Cornman stimulated many young men to begin work in educational research. Edward L. Thorndike, who has since become the wizard of the objective standard, wrote in the *Forum* in 1905 as follows: "The study of education is beginning to be quantitative, we are becoming properly disgusted with the one-sided booking which only takes account of dollars spent and neglects the debit side, the income in knowledge, habits, power, zeal, and ideals. This ambition toward an exact objective measurement of the results of educational endeavor is a symptom of healthy scientific fervor and also of common-sense wisdom. No one possessed of science or sense will deny the value of successful quantitative study of school work."

Ayres's Spelling Scale.[1] — All of the words which compose the Ayres Spelling Scale were selected on the basis of their frequency in the letters from some 7000 children in eighty-

[1] Distributed by the Russell Sage Foundation, New York City.

four widely separated cities, in newspaper articles, and in selections from standard literature. The manuscripts examined aggregated 368,000 words from 2500 different writers.

The one thousand words most frequently used were selected for the Ayres Spelling Scale. These words were grouped into fifty lists of twenty words each. The difficulty of these groups was tested by giving them to the children of a number of cities. After the first test the words were regrouped into fifty lists of twenty words each and again presented to the children of the grades.

On the basis of these two tests the original one thousand words were arranged into twenty-six groups. The systematic arrangement of these twenty-six groups, with the difficulty each offers expressed in per cent, constitutes the well-known and popular Ayres Spelling Scale.

The Buckingham Spelling Scale.[1] — The author of this scale chose fifty words from five spelling books, each of which was found in at least two of the spelling books. These words were arranged into two lists of twenty-five each by means of a statistical method. In the final arrangement the lists are consistently progressive in difficulty from the third grade to the eighth. The relative difficulty of each word is likewise determined. The comparatively few words employed in this test limits its practical value.

Starch's Spelling Scale.[2] — Starch has a spelling scale which is composed of six lists each of which contains one hundred words. These words were chosen from Webster's *New International Dictionary*. The plan consisted of

[1] Prepared by Prof. R. B. Buckingham, University of Illinois.

[2] Prepared by Prof. Daniel Starch, University of Wisconsin.

choosing the first defined word on the even-numbered pages of the dictionary and of the arrangement of these in the order of the number of letters composing them.

Jones's Spelling Demons.[1] — Jones has listed the one hundred words which he found most frequently misspelled by children. He calls this group the "One Hundred Spelling Demons of the English Language." Teachers in the upper grades should drill the pupils upon these words until they are mastered.

Method of Teaching Word Lists. — Good sense as well as good method prompts one to determine the relative difficulty of the words listed for the term or year by giving to the class without previous preparation all of the words listed. These words should then be arranged in the order of their relative difficulty. The relative difficulty of the words in any list is indicated by the number of persons who misspell each.

Writing Standards

Thorndike's Handwriting Scale. — The first satisfactory result, from a practical point of view, of all the agitation for quantitative standards of measurement occurred in 1910. In that year Thorndike's Scale for Judging Handwriting appeared in the *Teachers College Record*. Referring to this scale, Ayres says, "The credit of developing the first measuring scale for handwriting belongs to Professor Edward L. Thorndike of Teachers College, Columbia University. The publication, in March, 1910, of his Handwriting Scale constituted a most important contribution not only to experimental pedagogy, but to the entire movement for the scientific study of education."

[1] *Child's Own Spelling Book*, Jones.

In reference to the need of such a scale, Thorndike said: "At present we can do no better than estimate a handwriting as very bad, good, very good, or extremely good, knowing only vaguely what we mean thereby, running a risk of shifting our standards with time and only by chance meaning the same by a word as some other student of the facts means by it. We are in the condition in which the students of temperature were before the discovery of the thermometer, or any other scale for measuring temperature beyond the very hot, hot, warm, lukewarm, and the like, of subjective opinion."

The Thorndike scale is composed of the handwriting of children in grades five to eight inclusive. The writing from these grades was grouped into eleven groups on the basis of quality. The quality of the groups is represented by figures 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, and 17 respectively. Quality 7 represents the poorest samples taken from grade five, and quality 17 represents the best samples taken from grade eight. The steps of difference between the qualities were equal in the sense of being called equal by from twenty-three to fifty-five competent judges. This means that 14 is as much better than 13 as 13 is than 12; that 13 is as much better than 12 as 12 is better than 11, and so on; that quality 14 is two times as far above zero merit in handwriting as quality 7.

The scale includes quality 18, which was taken from a copy book, and qualities 4, 5, and 6. Samples 5 and 6 were taken from the fourth grade and sample 4 was manufactured for the purpose of extending the scale below the merit of fourth-grade children.

In the November issue of the *Teachers College Record* for 1914, Thorndike presents a more fully developed hand-

writing scale. This edition is in many respects a marked improvement over the 1910 edition. The wide variation of form presented in this standard makes it exceedingly valuable in evaluating the legibility of various types of handwriting.

Teachers who habitually think of quality in terms of grades can, for all practical purposes, easily transfer the qualities of the Thorndike scale into grades, by multiplying the numbers of the scale by 5.8. Those who have measured the merit of handwriting with this or the Ayres scale will not be content to judge the merit of writing in terms of personal experience.

Ayres's Handwriting Standard. — In November, 1911, Leonard P. Ayres of the Russell Sage Foundation began a preliminary experiment to determine the relative legibility of different samples of handwriting. He early concluded that quality of legibility is measurable, and proceeded to perfect a writing scale with that in mind. His first printed scale appeared in February, 1912. In discussing the merits of this scale he says: "The method by which the present scale has been produced, and the criterion on which it rests as a basis, differ radically from those adopted by Professor Thorndike. The difference in the basis is that in the present case legibility has been adopted as a criterion for rating the different samples in place of 'general merit' used as the basis of the Thorndike scale. The change substitutes function for appearance as a criterion for judging handwriting."

Ayres gathered 1578 samples of writing from forty school systems. The samples were read by ten readers, each of whom by means of a stop watch recorded the exact number of seconds required to read each sample. The samples

were then placed in eight groups on the basis of the time required to read them. The following table shows the rating of a type sample of each group.

TABLE I

Point on Scale	Rating in Words Read per Minute of Sample Found at Each Point
90%	209.2
80%	202.7
70%	195.1
60%	186.2
50%	175.7
40%	163.4
30%	149.1
20%	132.2

The scale was divided into three longitudinal divisions on the basis of slant. The top, or A division, contains the vertical samples. The middle, or B division, contains the samples of medium slant, and the lower, or C division, contains the samples of extreme slant. As implied in the above table the scale is divided into eight vertical divisions, each of which contains a sample of each slant. The three samples in the right column are marked 90%, those in the next column to the left 80%, etc.

Because of the inclusion of samples representing the three main types of slant, this scale is easily applied. The application of this scale to the handwriting of most school systems at once reveals wide variation in writing abilities, which implies either widely different methods of teaching, widely different ideals as to the sort of writing which should obtain, or widely different degrees of zeal towards securing good writing. The following graph (Fig. 1) of the writing abilities of the children of the Training School of the Illinois

State Normal University, as shown by the first application of the Ayres scale, reveals the sort of variation which frequently exists when subjective standards alone are relied upon.

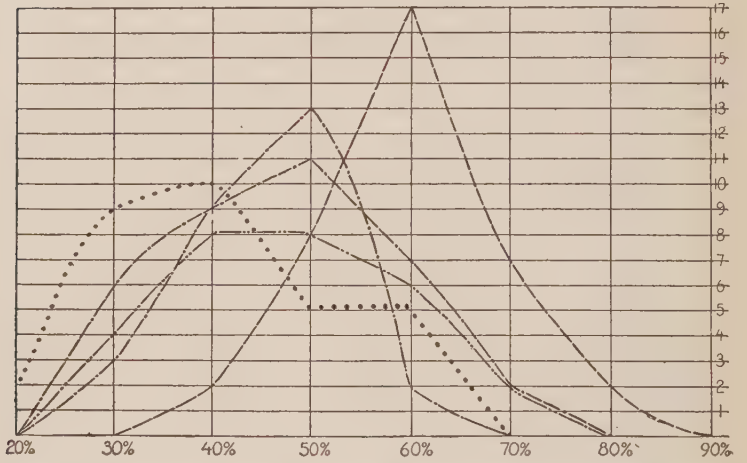

FIG. 1. — GRAPH OF WRITING ABILITIES, THOMAS METCALF TRAINING SCHOOL, ILLINOIS STATE NORMAL UNIVERSITY.

The first application of the scale showed that there were two children in the sixth grade who wrote better than any of the children of the seventh and eighth grades. It showed also that there were six children in the sixth grade who made a grade of 70, while there were but four children in both the seventh and eighth grades who reached the 70 mark. This test makes it perfectly evident, on the one hand, that grades five and six needed no extra consideration rela-

tive to drill in writing, while, on the other hand, it showed that grades seven and eight needed a writing revival.

The following graph (Fig. 2) shows what was accomplished by the eighth-grade teacher after he became conscious of the relative needs of his pupils. In the November

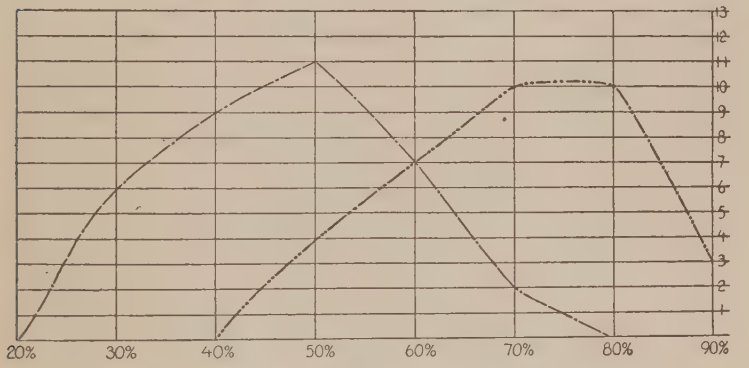

FIG. 2.

— — · Eighth grade abilities in handwriting October 10, 1918.
· · — · · — Abilities of the same eighth grade, May 8, 1919.
Figures on the base line represent abilities in per cent.
The figures in the vertical column indicate how many possess such abilities.

test fifteen pupils made grades of 40% or less; in the May test none made a grade less than 50%. In the November test only two pupils made grades of 70%; while in the May test ten pupils made grades of 70%, ten pupils made grades of 80%, and three pupils made grades of 90%. A careful examination of Fig. 2 will reveal other marked changes which resulted from an application of the handwriting scale.

The Gettysburg Edition of Ayres's Handwriting Scale.[1] — Numerous changes have been introduced in this edition.

[1] This third edition of the Ayres Handwriting Scale was published in 1917 by the Russell Sage Foundation.

The specimens are all on ruled paper. The slant of all specimens is the same. The language used is a portion of Lincoln's Gettysburg Address — hence the name.

Doubtless this edition is valuable for determining the quality of handwriting in schools employing a uniform system of handwriting. It is not so valuable as the so-called three-slant scale when individuality of handwriting is encouraged.

Freeman's Chart for Diagnosing Faults in Handwriting.[1] — Professor Frank N. Freeman, a specialist in the pedagogy of handwriting, has prepared a chart which enables teachers of handwriting to locate definitely the main difficulty. By the process of analysis he determined the five fundamental characteristics of worthy handwriting. On the basis of this analysis he arranged samples of each fundamental characteristic in the order of their degree of merit. He arranged these as follows: (1) uniformity of slant; (2) uniformity of alinement; (3) quality of line; (4) letter formation; and (5) spacing. Three degrees of the quality of each fundamental characteristic are further shown by three samples charted in the order of merit. The qualities of these samples are rated 1, 3, and 5, respectively.

With the Ayres and Thorndike scales with which to find the relative merit of the handwriting of children, and the Freeman charts with which to locate its points of merit and demerit, the pedagogy of handwriting demands the respect of school administrators. At last the teaching of handwriting has reached the stage of scientific pedagogy.

Starch's Handwriting Standard. — Professor Daniel Starch

[1] "An Analytical Scale for the Judging of Handwriting." — *The Elementary School Journal* (April, 1915).

of the University of Wisconsin reported his Handwriting Test in the *Journal of Educational Psychology* for October, 1913. He pointed out that the Thorndike and Ayres scales are measures only of form and legibility, respectively. He argued that a simple analysis of handwriting shows that its three chief elements are legibility, producibility, and form.

Starch held that legibility can be determined best by reading areas of handwriting which are exposed through circular openings in a cardboard. In conformity with this theory he prepared a device for measuring handwriting. From a piece of cardboard, he cut three circular openings which were each 2.5 cm. in diameter. By shifting the cardboard about over the writing to be measured, he was able to test its legibility at several places. The number of letters exposed and the time required to read them were recorded after each trial. From the records of several exposed areas the average reading per letter was computed.

Starch's experiments proved that there is a remarkably close correlation in the results obtained by the Letter-Exposure Test and those secured by the application of the Thorndike and the Ayres scales.

It is doubtful if the Letter-Exposure Test is as convenient for testing the handwriting of large numbers of children as is either the Thorndike or Ayres scales; certainly it is not so comprehensive as the Freeman scale.

After testing the efficiency of writing scales, Starch says: "We may conclude that after some practice in the use of a scale the measurements with either scale are from three to four times as accurate as the valuations made by the usual percentile marking system."

Reading Standards

In the last few years a number of excellent reading tests have been prepared and standardized. The extensiveness of these tests as well as their accessibility make it unnecessary to reproduce them. A general discussion of their merits will suffice. Foremost among these are the following: Thorndike's scales, Alpha 2 and A 2 — the former is a test of the child's interpretative ability and the latter of his vocabulary — these are practical tests of much merit;[1] the Kansas Silent Reading Test[2] by Dean F. J. Kelly, of the University of Kansas; Monroe's Standardized Silent Reading Tests;[3] Gray's Silent Reading Test; Gray's Oral Reading Test;[4] and Courtis's Silent Reading Tests.[5] These are the best known of the many reading tests which have appeared.

Each of these tests is workable and exceedingly valuable. The Kansas Silent Reading Test requires less effort to apply it than do the others. The overlapping feature of the Thorndike tests will commend them to practical teachers. The Gray tests when carefully supervised by a competent person are excellent. Their application requires too much time and ability for them to be of value to the average school. These tests have been used more generally in surveys than have the others. The Monroe tests have two decided advantages. The materials are taken from school readers, and the three-set series prevents the necessity of using a test until the children become

[1] *Teachers College Record.*

[2] *Journal of Educational Psychology.*

[3] Bureau of Educational Measurements and Standards, Emporia, Kan.

[4] *Studies in Elementary School Reading Through Standardized Tests.*

[5] *Standard Research Tests in Silent Reading*, Courtis.

familiar with it. The Courtis tests are especially suitable for the primary grades owing to the simplicity of the answers required. Like the Monroe tests, the three forms are approximately of equal difficulty.

The following tests and scales are worthy of consideration: Brown's Silent Reading Test; Fordyce's Scale for Measuring Achievements in Reading, the Minnesota Tests in Reading, Jones's Scale for Teaching and Testing Elementary Reading, Price's Scale for Teaching and Testing Elementary Reading (oral); and Starch's Silent Reading Test.

Composition Standards

Rice's Language Test.[1] — In 1903 Rice gave a detailed report of the test he made in language. This test extended to nine cities, and included twenty-two schools, containing 8300 children. The compositions were arranged in five groups on the basis of relative merit. The papers of each group were graded 100%, 75%, 50%, 25%, 0% respectively. The results showed conclusively that there was a wide variation in the English abilities tested by him, but owing to the strong probability of error in his results, this test has not been employed as a standard for determining English ability.

Though Dr. Rice's results are of little value as a standard, his experiments have stimulated two lines of research in education, which are fraught with wonderful possibilities. I refer, on the one hand, to the investigations which have had for their goal the establishment of objective standards of measurement, and on the other, to the investigations to determine minimum essentials. Both of these problems

[1] *The Forum*, 1903.

were raised by Dr. Rice and he has lived to see some partial solutions of both.

Report of Superintendent Bliss on English Composition. — While at Elmira, N. Y., Superintendent Bliss reported in the *Psychological Clinic* for March, 1912, a series of tests he had carried on in composition. He had the children reproduce stories read to them. These reproductions were taken to the central office and grouped, by the plan practiced by Rice, into five groups. He determined the median ability for all of the children in each of the grades above the third. He then reported the median ability for all of the children of that grade in the city, with the median for the particular grade in each school. He also published sample compositions of each group of compositions in the scale.

The results obtained from the use of this scheme were little less than marvelous. He says: "In a Massachusetts school system, with 33 third-grade teachers the initial test showed a city average of 8.5 points, with twenty-three classes below the requirement and eight classes above. One year later the city average was 19.2 points, with thirteen classes below the requirement and nineteen classes above. This represented an increase of 126% in the level of efficiency in the third grade." Mr. Bliss cites other cases where even greater per cents of increase were made by the use of this method.

The Hillegas Scale for the Measurement of Quality in English Composition. — In September, 1912, Professor M. B. Hillegas published his composition scale in the *Teachers College Record*. In the introduction to this scale Professor Hillegas refers to the previous efforts at quantitative standards by Cornman, Rice, Stone, and Thorndike.

He does not, however, refer to Rice's pioneer effort to establish a standard in English composition in 1902.

Hillegas used a method similar to the one Thorndike used in determining quality in handwriting. He, aided by one other person, graded about 7000 compositions into ten classes. From these ten classes seventy-five samples were chosen. Artificial samples were employed at the extremes of his scale, as they were in Thorndike's writing scale, in order to produce a scale of wide range of measurement. In all there were eighty-three samples employed. These eighty-three samples were given to more than one hundred persons who were requested to rank them 1, 2, 3, etc., in order of their merit.

Owing to misunderstandings and errors, only seventy-three records were used. On the basis of like characteristics these records were reduced to twenty-three. This reduced number of samples contained all the important steps in quality from the poorest to the best. Six other samples, including two artificial ones, were finally added, making a total of twenty-nine samples.

The twenty-nine samples were ranked by 234 judges. On the basis of this ranking the number of samples was reduced to ten. The difference between the merit of the first and second samples in the scale is not identical with the difference in merit of any other two successive samples. These differences, however, are sufficiently equal for practical purposes.

The Hillegas scale is a meritorious piece of work. It is a decided step in the right direction. The brevity of the samples and the natural gradation from one quality to another make its application from this point of view quite easy. This scale nevertheless has many defects. Commenting

upon it Frank W. Ballou of the Department of Educational Investigation and Measurement of the Boston schools says: "An experiment with the Hillegas scale showed that the use of such an objective measure did unify the grades given to compositions by teachers. It was also found, however, that the Hillegas scale was not satisfactory to the teachers of Newton, owing to what seemed to them to be inherent faults. These faults may be stated briefly as follows: first, the scale aims to measure too varied a product; second, the compositions in it are not typical of good school work — (*a*) some are artificial, (*b*) others are bookish, really reproductions, and (*c*) no conversation is contained in any of them." [1] As Courtis's practical tests in arithmetic grew out of an attempt to use the conclusions of Stone, so an attempt on the part of the teachers of Newton, Mass., to use the Hillegas scale led directly to the practical Harvard-Newton Scales for the Measurement of English Composition.

The Harvard-Newton Scales. — These scales are the product of the work of the eighth-grade teachers and the elementary-school principals in the public schools of Newton, Mass., assisted by the teachers of English in the high schools of Newton, and by teachers and principals in Arlington, Mass., and Boston, under the direction of Frank W. Ballou with the coöperation of the Joseph Lee Fellow for Research in Education.

The compositions were written by the eighth-grade pupils of Newton. All of the compositions of the eleven grade schools were grouped into five groups. Each group included specimens of a given type of composition (narration, description, etc.). Each eighth-grade teacher selected 25%

[1] A Preliminary Discussion to the Harvard-Newton Scales.

of the compositions of his grade on the basis of their representative merit. These selected compositions from the eleven schools were then arranged into four groups. Twenty-four readers were instructed to arrange the themes of each group in the order of their merit and to rate arbitrarily the best theme 95% and each of the remaining themes with reference to this standard.

These ratings were tabulated and the median grade for each composition was worked out. For example, the highest grade for the best composition was 95%, the lowest grade was 68%, and the median grade was 83%. In like manner tabulation was made of the distribution of the ranks given each composition. They were then arranged in serial order according to the median ranks, beginning with the highest. By means of this latter method it was discovered that 25% of the judges were radical in their judgment. Consequently the 25% of radical readers was cut off. The scale was then built on the median percentile basis. Out of the twenty-five compositions which were chosen to represent each form of discourse, six typical compositions were finally chosen for the scale. The difference in degree of quality was carefully worked out and the samples were arbitrarily marked 95%, 85%, 75%, 65%, 55%, and 45%, respectively.

The Harvard-Newton Scales[1] commend themselves to the practical school man on the following points: first, there is a scale for each form of discourse; second, the compositions in the scale are the real productions of children and not "built up compositions"; third, each scale consists of only six types. This makes it an easy matter for the person doing the grading to familiarize himself with

[1] The Harvard Press, 50 cents.

the scales. The greatest weakness in these scales lies in the fact that they are best suited for eighth-grade pupils.

An application of these scales reveals the fact that there is but slight variation in the grades given by two or more judges. Indeed, the variation is so slight that a single investigator can feel reasonably certain that his grades will not vary widely from the median grades determined by several judges.

The Harvard-Newton Scale is quite as practical, though not so easily applied, as the Thorndike and the Ayres handwriting scales, and the Courtis Tests in Arithmetic (Series B). It has a real ring to it and merits a wider use than it has at present.

The Trabue Composition Standard.[1] — The Nassau County Supplement to the Hillegas Scale in composition, which was prepared by M. R. Trabue, consists of a graded series of compositions arranged in the order of their general merit. These compositions are arranged on a single sheet of paper in much the same fashion as are the samples of handwriting in the Ayres and the Thorndike handwriting scales. The most commendable feature of this standard is its simplicity. Its weakness is due to the poor gradation and the local character of some of the samples.

The Breed and Frostic Composition Scales. — Breed and Frostic have derived a composition scale for sixth-grade pupils. A portion of a story was read to the class, after which the pupils attempted to complete it in twenty minutes. The method employed in selecting and grading the compositions constituting the scale is similar to the one employed by Hillegas.

Willing's Composition Scale. — M. H. Willing produced

[1] *Teachers College Contributions to Education*, 1916.

this scale as a master's thesis at the University of Chicago. The original compositions were taken from grades four to eight inclusive. The gradation of the compositions in the scale was based upon their "story value" and the frequency of errors. This scale is meritorious in that the compositions are brief, well graded, and easily accessible for testing compositions.

Arithmetic Standards

Rice's Arithmetic Test. — In the October number of the *Forum*, 1902, Dr. Rice reported the results of an arithmetic test which he had conducted in seven different cities, including eighteen buildings and 8000 children. As Stone pointed out later, Dr. Rice's results were not satisfactory as a standard, due to certain limitations in the problems used and the character of the methods employed in gathering and scoring these.

The Courtis Standard Tests.[1] — In December, 1910, W. S. Courtis, of Detroit, reported in the *Elementary School Teacher* his Standard Test in Arithmetic (Series A). This test developed as a result of applying the Stone test in the Detroit Home and Day School, where Mr. Courtis was head of the Department of Science and Mathematics. After a free use of his Series-A Test, which consisted of testing the pupils' ability to use the four fundamental processes when expressed in the tables ordinarily used in schoolrooms, and of testing the pupils' ability to employ the reasoning processes involved in the solution of problems suitable to the grammar grades, Mr. Courtis remarked that "The work done with Series A has proved that the basic

[1] Because of their wide distribution these tests are not reproduced. They may be secured from Mr. Courtis, of Detroit, Mich.

problem in education to-day is that of ministering adequately to individual needs. The first step towards this end is the formation of definite objective standards." The standards derived from the use of Series A, however, are either complex or of questionable value, owing to the uncertainty of their meaning. This is particularly true of the reasoning tests, in which mere ability to read is a large factor. These tests have been displaced by his Series-B Tests.

Series B is the result of an attempt to secure definite objective standards for each of the four fundamental operations in whole numbers. With the establishment of this standard it is possible to set for each grade just the degree of skill in each of the fundamental processes that is reported in the median scores of the classes that have been tested.

The following table shows the median skills of three distinct groups of children in the fundamentals of arithmetic when tested by the Series-B Tests. The approximation of the series reveals the universal character of the results.

TABLE II

		5TH GRADE			6TH GRADE		
		D	B	G	D	B	G
Addition	A	6.7	7.2	7.1	8.4	8.3	8.
	R	3.9	3.7	3.7	4.6	4.9	4.4
Subtraction	A	8.	7.6	6.5	8.8	9.	8.9
	R	5.5	4.9	4.9	6.2	6.3	6.1
Multiplication	A	6.	5.8	6.	7.4	6.9	7.2
	R	3.8	3.3	2.6	4.8	4.8	4.5
Division	A	4.9	4.5	4.5	6.4	5.5	5.8
	R	2.7	2.	2.3	4.4	3.3	4.3

		7TH GRADE			8TH GRADE		
		D	B	G	D	B	G
Addition	A	9.2	9.2	8.9	10.2	11.	9.7
	R	3.4	5.6	4.7	6.7	7.5	5.6
Subtraction	A	9.8	10.	10.2	12.3	11.4	11.7
	R	7.3	6.9	7.8	9.5	8.6	8.4
Multiplication . . .	A	9.6	8.	8.4	10.5	9.5	9.7
	R	6.	5.1	5.2	7.	6.5	6.4
Division	A	8.6	6.9	7.6	10.6	6.9	7.6
	R	7.1	5.1	5.1	8.8	6.9	6.3

D = Detroit (1,315 children tested)
B = Boston (20,441 children tested)
G = General (3,618 children tested)
A = Number of problems attempted
R = Number of problems right

Courtis early discovered the value of the objective standard in determining individual variation. He says: "The results of the tests disclosed the usual wide range of individual variation in every grade." After using these objective standards for some time Professor Courtis writes: "Not only did the variabilities decrease, but unhoped for degrees of accuracy were attained."

The following graphs of the abilities of intermediate pupils in multiplication and oral reading as determined by the Courtis and Gray scales show conclusively that variability is easily detected by the application of objective standards.

The graphs shown in Fig. 3 reveal two distinct groups of abilities in each subject. This may mean that little care has been given to promotions. It is more likely to indicate a lack of sufficient drill under proper conditions. After

the abilities are once revealed there is every reason to believe that a conscientious teacher will cause the abilities of the lower group to be raised and thereby reduce the degree of variability.

Just as a proper diagnosis in medicine is a prerequisite to effective medical treatment, so a proper diagnosis of

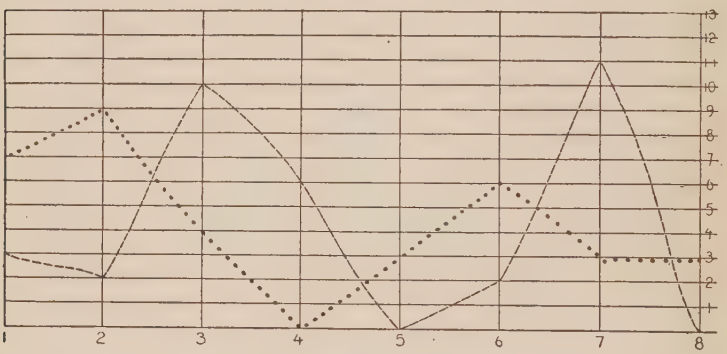

FIG. 3.

. . . . . A graph of abilities in oral reading.
— — — A graph of abilities in multiplication.

Figures on base line represent units of ability.
Figures in vertical column indicate the number of persons having such abilities.

the specific abilities of pupils is a prerequisite to the application of proper methods.

The Courtis tests are valuable mainly for testing skill in the four fundamentals of arithmetic. The following tests are for purposes of diagnosis.

The Cleveland-Survey Arithmetic Tests. — These tests consist of the fifteen divisions that are given below. They were used in the Cleveland survey to determine the arithmetical abilities of the children, so far as they were stimulated by the processes involved in the test.

Set A. Addition

1	6	9	0	4	1	7	9	3	2	1	3	6
2	6	5	1	2	3	7	6	0	4	5	8	9

Set B. Subtraction

9	7	11	8	12	1	9	13	4	12
9	3	6	1	3	0	7	8	3	6

Set C. Multiplication

2	4	9	0	5	4	2	7	4	9
2	7	8	2	6	1	9	6	0	5

Set D. Division

3)9 4)32 6)36 2)0 7)28 9)9 3)21

Set E. Addition

5	2	9	2	6	1	9
2	8	8	8	3	4	7
2	8	0	5	4	2	1
0	5	7	0	8	5	5
4	1	6	6	8	4	3

Set F. Subtraction

616	1248	1365	1092	716
456	709	618	472	344

Set G. Multiplication

2345	9735	8642	6789	2345
2	5	9	2	6

Set H. Fractions

$\frac{3}{5}+\frac{1}{5}=$ $\frac{6}{9}-\frac{4}{9}=$ $\frac{4}{9}+\frac{1}{9}=$ $\frac{8}{9}-\frac{7}{9}=$

Set I. Division

$4\overline{)55424}$ $\quad$ $7\overline{)65982}$ $\quad$ $2\overline{)58748}$ $\quad$ $5\overline{)41780}$

Set J. Addition

7	9	4	7	2	9	6	7	7	8	9	4	3	2
5	2	5	1	9	6	9	1	8	0	5	3	1	1
4	4	8	9	4	2	6	5	5	7	3	7	7	6
2	8	1	4	8	4	7	1	4	1	4	7	6	6
6	2	4	3	5	7	0	4	1	8	6	0	9	1
0	7	8	2	1	1	4	6	8	5	2	2	6	8
5	5	5	8	5	3	3	5	2	1	3	9	3	6
1	3	1	5	2	9	7	3	1	3	9	5	4	9
8	6	3	2	4	2	1	3	3	7	2	6	5	7
3	1	9	7	3	3	6	7	9	4	2	3	4	5
2	4	6	7	6	8	0	6	8	9	8	4	2	2
9	8	3	1	7	5	6	1	4	4	5	8	9	2
9	8	5	9	6	5	6	7	5	4	6	8	9	4

Set K. Division

$21\overline{)441}$ $\quad$ $36\overline{)672}$ $\quad$ $23\overline{)483}$ $\quad$ $51\overline{)1173}$

Set L. Multiplication

8246	3597	5739	2648	9537
29	73	85	46	92

Set M. Addition

7493	8937	8625	2123	5142	3691
9016	6345	4091	1679	0376	4526
6487	2783	3844	5555	4955	7479
7591	4883	8697	6331	9314	2087
6166	1341	7314	6808	5507	8165

Set N. Division

$67\overline{)32763}$ $\quad$ $48\overline{)28464}$ $\quad$ $97\overline{)36084}$ $\quad$ $59\overline{)29382}$

SET O. FRACTIONS

$1\frac{1}{5}+\frac{1}{6}=$ $\quad 1\frac{9}{4}-\frac{1}{4}=$ $\quad \frac{3}{4}\times\frac{5}{6}=$ $\quad 2\frac{0}{21}\div\frac{1}{6}=$

The time allowances for the several tests are as follows:

Set A . . .	30 seconds	Set I . . .	1 minute
Set B . . .	30 seconds	Set J . . .	2 minutes
Set C . . .	30 seconds	Set K . . .	2 minutes
Set D . . .	30 seconds	Set L . . .	3 minutes
Set E . . .	30 seconds	Set M . . .	3 minutes
Set F . . .	1 minute	Set N . . .	3 minutes
Set G . . .	1 minute	Set O . . .	3 minutes
Set H . . .	30 seconds		

The Woody Arithmetic Scales. — The Woody scales consist of Series A and B, each of which includes the four fundamental processes in arithmetic. Series B consists of problems chosen from Series A. The addition scale of Series A is given below.

Name.....

When is your next birthday?..... How old will you be?.....

Are you a boy or girl?..... In what grade are you?.....

(1)	(2)	(3)	(4)	(5)	(6)	(7)
2	2	17	53	72	60	3+1=
3	4	2	45	26	37	
	3					

(8)	(9)	(10)	(11)	(12)	(13)
2+5+1=	20	21	32	43	23
	10	33	59	1	25
	2	35	17	2	16
	30			13	
	25				

(14)
$25+42=$

(15)
100
33
45
201
46

(16)
9
24
12
15
19

(17)
199
194
295
156

(18)
2563
1387
4954
2065

(19)
$ .75
1.25
.49

(20)
$12.50
16.75
15.75

(21)
$8.00
5.75
2.33
4.16
.94
6.32

(22)
547
197
685
678
456
393
525
240
152

(23)
$\frac{1}{3}+\frac{1}{3}=$

(24)
4.0125
1.5907
4.10
8.673

(25)
$\frac{3}{8}+\frac{5}{8}+\frac{7}{8}+\frac{1}{8}=$

(26)
$12\frac{1}{2}$
$62\frac{1}{2}$
$12\frac{1}{2}$
$37\frac{1}{2}$

(27)
$\frac{1}{8}-\frac{1}{4}-\frac{1}{2}=$

(28)
$\frac{3}{4}-\frac{1}{4}=$

(29)
$4\frac{3}{4}$
$2\frac{1}{4}$
$5\frac{1}{4}$

(30)
$2\frac{1}{2}$
$6\frac{3}{8}$
$3\frac{3}{4}$

(31)
113.46
49.6098
19.9
9.87
.0086
18.253
6.04

(32)
$\frac{3}{4}+\frac{1}{2}+\frac{1}{4}=$

(33)	(34)	(35)	(36)	(37)
.49	$\frac{1}{6}+\frac{3}{8}=$	2 ft. 6 in.	2 yr. 5 mo.	$16\frac{1}{3}$
.28		3 ft. 5 in.	3 yr. 6 mo.	$12\frac{1}{8}$
.63		4 ft. 9 in.	4 yr. 9 mo.	$21\frac{1}{2}$
.95			4 yr. 2 mo.	$32\frac{3}{4}$
1.69			6 yr. 7 mo.	
.22				
.33				
.36				
1.01				
.56				
.88				
.75		(38)		
.56		25.091+100.4+25+98.28+19.3614=		
1.10				
.18				
.56				

These scales are especially valuable for diagnosing the arithmetical ailments of children. The variation and gradation of the Woody scales are commendable features of these scales. The following quotation from the author indicates their specific value: "The great variety of the problems in these scales, and the fact that the problems in each of the various operations proceed from the simplest to the more difficult problems, aid greatly in the location of the weaknesses of the class. If a large number in a class fail to invert the divisor in the problems in division of fractions, or if a large number in a class fail to locate the decimal point properly in the problems in multiplication of decimal fractions, a teacher should know immediately that these classes need more practice in these particular processes. In a like manner, by locating the particular types of problems missed, one should be able to direct the work of a class more intelligently."

Ballou's Addition-of-Fractions Tests. — These tests grew out of an analysis of the specific steps involved in adding two or more fractions. Since specific abilities are required to make these specific steps in solving problems in the addition of fractions, Ballou rightly concluded that there should be a test for these abilities. The Ballou tests are given below.

THE BALLOU TEST FOR ADDITION OF FRACTIONS

TIME, TWO MINUTES

Test 1

(1) $\frac{1}{4}$ / $\frac{1}{4}$ (2) $\frac{3}{14}$ / $\frac{1}{14}$

Test 2

(1) $\frac{1}{3}$ / $\frac{1}{6}$ (2) $\frac{2}{7}$ / $\frac{3}{14}$

Test 3

(1) $\frac{3}{5}$ / $\frac{11}{15}$ (2) $\frac{5}{8}$ / $\frac{1}{2}$

Test 4

(1) $\frac{1}{7}$ / $\frac{9}{10}$ (2) $\frac{7}{5}$ / $\frac{1}{4}$

Test 5

(1) $\frac{1}{10}$ / $\frac{1}{6}$ (2) $\frac{4}{8}$ / $\frac{5}{12}$

Test 6

(1) $\frac{1}{6}$ / $\frac{9}{10}$ (2) $\frac{5}{6}$ / $\frac{3}{8}$

BOSTON MEDIANS OF THE BALLOU ADDITION OF FRACTIONS TESTS

Grade	Pupils Tested	Test 1		Test 2		Test 3		Test 4		Test 5		Test 6	
		Speed Medians	Accuracy Medians	Speed Medians	Accuracy Medians	Speed Medians	Accuracy Medians	Speed Medians	Accuracy Medians	Speed Medians	Accuracy Medians	Speed Medians	Accuracy Medians
VI . .	1205	10.7	79.6	7.7	65.6	5.5	41.9	4.0	69.5	4.6	51.0	4.4	48.6
VII . .	1243	16.5	86.6	10.1	72.9	7.3	46.1	5.3	69.2	6.3	54.9	5.7	48.1
VIII .	1130	20.7	88.2	11.6	74.4	8.4	47.4	6.0	67.8	6.9	52.4	6.4	46.5

The other arithmetic tests which have appeared have not attracted such wide attention as those given. Reasoning tests in arithmetic, one each by Stone and Starch, have been used quite extensively. Other tests will be forthcoming. Courtis is perfecting a diagnostic test in the fundamentals of arithmetic, which promises much.

Drawing Scales

The Thorndike Scale for Measuring Achievement in Drawing. — In the *Teachers College Record* for November, 1913, Professor Thorndike presented a scale for the measurement of achievement in drawing. In reference to the purpose of this scale he says: "It is the purpose to present a provisional scale by which achievement and improvement in drawing can be measured with somewhat the same clearness, exactness, and commensurability as achievement and improvement in lifting weights."

The same general method which was used in determining the Thorndike Handwriting Scale and the Hillegas Composition Scale was employed in the making of this drawing scale. Forty-five drawings of children were first submitted to a number of critics whose ratings reduced the number to a series of fifteen drawings graded from zero up.

This series of fifteen drawings was rated by 376 persons, of whom sixty were artists of distinction, eighty were supervisors of art, and 236 were students of education and psychology.

The unit of the scale was one merit. This unit is "the difference of merit in children's drawings, which 75% of artists, teachers of art, and intelligent judges generally can distinguish, and which 25% of them fail to distinguish." The drawing lowest in the scale was judged of zero merit.

The difference of merit between two drawings is not necessarily a unit merit. It depends upon the relative number of judges who considered one drawing better than the other. If 75% of the judges considered one drawing superior to another the difference in quality is called a unit of merit. If less than 75% of the judges distinguished a difference in merit between two drawings, the difference between the two is less than one unit. If more than 75% of the judges discerned a difference in merit the difference in quality was marked more than one unit. The following is the determined rating:

TABLE III

Drawing 1 . . .	— merit	Drawing 8 . . .	10.5 merit
Drawing 2 . . .	2.4 merit	Drawing 9 . . .	11.8 merit
Drawing 3 . . .	3.9 merit	Drawing 10 . . .	12.6 merit
Drawing 4 . . .	5.7 merit	Drawing 11 . . .	13.5 merit
Drawing 5 . . .	6.5 merit	Drawing 12 . . .	14.4 merit
Drawing 6 . . .	7.8 merit	Drawing 13 . . .	16 merit
Drawing 7 . . .	8.6 merit	Drawing 14 . . .	17 merit

The reader should see the drawings in the *Teachers College Record*, which accompany these merit values.

No one is more conscious of the limitations of this scale than is Professor Thorndike. In spite of its limitations it is a valuable contribution to experimental education. The method of attack, the care employed in determining differences in merit, and the scientific attitude of the author in the whole procedure will have a wholesome effect upon investigators. It is as practical in determining the qualities of children's drawings as are the writing scales in determining the quality of handwriting. It would better meet the needs of the schools if it attempted to measure the various

aspects of children's art instead of a single aspect. It is to be hoped that it will be followed by other drawing scales which will measure the various qualities of children's drawings.

Geography Scales

Of the several attempts to standardize the materials in geography for the upper grades of the elementary school, that by Professors Hahn and Lackey of the State Normal School of Wayne, Nebraska, is certainly the most successful of those which have as yet reached the public.

Hahn-Lackey Geography Scale. — This scale consists of two hundred and sixteen questions arranged in twenty-three columns, on the basis of their relative difficulty. The determination of the relative difficulty of these questions and their arrangement in columns resulted from an examination of the answers of 1696 children in twelve different schools, to whom the questions were given.

The known difficulty of the questions, their arrangement in twenty-three columns in the order of their known difficulty for pupils in grades four to eight inclusive, the specific directions relative to the values to be given, the answers received, the wide distribution of the subject-matter involved, and especially the practicability of this scale, place it alongside some of the best scales that have appeared.

History Tests

Tests of Information in American History. — So far, methodologists in American history have not succeeded in supplying an objective standard that is entirely satisfactory. The *Tests of Information in American History*[1]

[1] *Tests of Information in American History*, C. L. Harlan, College of Education, University of Minnesota.

is the most satisfactory of the attempted standards that have appeared on this subject.

It consists of ten distinct exercises which include a total of fifty elements, each of which when answered correctly is scored two points. These exercises were prepared for the seventh and eighth grades, though they might well be given to grades higher or lower than these. Tentative standard scores based upon more than two thousand answers have been determined already.

The Harlan tests are commendable in that they test the pupil's control of some very simple yet important data which are distributed over the field of American history. The data tested have a distinct educational significance in that they are samples wisely chosen from the several phases of American history. Moreover, both the questions asked and the answers required are simple and definite.

These tests have not as yet reached the quality possessed by some of the best tests in other subjects. Until the relative value of the information sought has been standardized and classified this test fails to possess an essential quality of standardized tests. It is to be hoped that these tests will be perfected and given to the public in the near future.

Standards in Algebra

Standardized Tests in First-Year Algebra.[1] — These tests consist of sixteen exercises which include the following subjects in the order given: collecting terms, subtraction, simple equations, parenthesis, special products, exponents, factoring, clearing of fractions, fractional factors, formulæ,

[1] Prepared by H. O. Rugg, University of Chicago, and J. R. Clark, Parker High School, Chicago.

quadratic equations, simultaneous equations, radicals, graphs, and quadratic equations with irrational roots.

These tests are well grouped, progressive, and sufficiently inclusive to be valuable. Through the coöperation of many schools, median scores have been determined and are now available.

Because of their progressive character these tests are admirably suited for diagnostic purposes. Effective diagnosis in first-year algebra is a fundamental problem. The diagnostic character of these tests makes them admirably suited to solve this problem.

Hurdles in First-Year Algebra. — A most ingenious use of tests in first-year algebra is reported in the *Journal of Educational Research* for January, 1920.[1] These tests were arranged by Murray A. Dalman, Director of the Department of Reference and Research in the Indianapolis Schools, for the algebra classes of the Emmerich Manual Training High School.

The tests under each topic in first-year algebra are graded into four groups which are labeled respectively C, B, A, and A^+. Each pupil is given four trials, if necessary, to "hurdle" each of these groups. A record of the attempts and successes of the several pupils is kept and used as a basis for classifying all pupils in algebra. As devices for diagnosing ability in algebra for the purpose of grouping pupils into classes, these tests will appeal strongly to practical teachers of algebra everywhere.

Standards Used to Measure Both Form and Content. — There is a prevailing notion abroad in educational circles that objective standards can be used only in measuring the

[1] The first issue of this journal is published for the University of Illinois by the Public School Publishing Co., Bloomington, Ill.

skills of pupils. Persons who hold this notion argue that since these standards measure skill only, the results of such measurements are of little value in determining the relative merit of teaching. They further argue that since the objective standards measure form and not content, any marked attention given to this sort of measurement will result in an overemphasis of form at the expense of content.

These arguments are based upon two fallacies: (1) It is fallacious to assume that only skill can be measured by the objective standard. It is true that standards for the measurement of skill were determined first. Standards for the measurement of abilities to reason, to enjoy, and to appreciate have followed. (2) It is fallacious to assume that attention to the measurement of such abilities as the fundamentals in arithmetic, handwriting, spelling, form in reading, etc., will result in an overemphasis of the formal subjects to the detriment of the content subjects. This would not be fallacious were it not true that grades far above the median indicate an undue emphasis of the subject taught and consequently are a mark of poor teaching.

It must be remembered also that an application of a standard test will detect an undue emphasis of some particular subject-matter, as well as an insufficient or overemphasis of it.

Diagnostic Value of Objective Standards. — Recognition of the diagnostic value of tests is manifested in the increased number of tests that are specifically intended for that purpose. A first-rate doctor would not think of prescribing a course of treatment for one who is seriously ill without an exhaustive diagnosis of the case. Teachers are beginning to have a similar professional conscience. In one's effort

to "put the oil where the squeak is" a sense of economy in time requires that the squeak be definitely located. An application of objective standards to the practical affairs of the schoolroom aids mightily in locating it. Once it is located, *good teaching* is required to remove it and to prevent its recurrence.

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